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A STATISTICAL STUDY OF UNCINARIASIS AMONG WHITE
MEN IN THE PHILIPPINES.¹

By WESTON P. CHAMBERLAIN.²

The subject of hookworm disease at the present time is so much before the public that it may be of interest to consider in detail one feature of the situation, namely, the occurrence of the disease among adult American males in these Islands. Of all the infections which commonly are included in books on tropical medicine there are few, if any, which have such a wide distribution geographically, and especially such a range in latitude as uncinariasis. It is found in many regions that can lay no claim to being tropical, or even subtropical. Therefore, when studying the origin of the disease among Americans in the Philippines, it is necessary to consider two widely separated sources of infection: First, the Philippine Islands, and, second, certain parts of the United States where the disease is endemic.

OPPORTUNITIES FOR INFECTION IN THE PHILIPPINES.

When a white man in the Philippines is found to be harboring hookworms one is apt to assume that he became infected in the Islands, and a study of helminthiasis among the natives shows that opportunity for soil contamination is not lacking.

The first extensive work performed along this line was the examination of

¹ Read at the first biennial meeting of the Far Eastern Association of Tropical Medicine, held in Manila, P. I., March 7, 1910.

² Major, Medical Corps, U. S. Army, president of the U. S. Army Board for the Study of Tropical Diseases as they occur in the Philippine Islands.

4,106 Filipino prisoners at Bilibid Prison (2) where 52 per cent were found to be the hosts of uncinaria, though rarely were these infections severe ones (3). The great majority of these prisoners were adult males. As high as 60 per cent of infections has been reported among Philippine Scouts in the United States Army (2). These high rates among Scouts and at Bilibid apparently are not a correct index of the prevalence of hookworm infection in the general population, if the results of subsequent work can be taken as representative. In the medical survey of Taytay (4), a representative Tagalog town in Luzon, 1,000 persons were examined and 11.6 per cent were found infected (males, 17.2 per cent; females, 6.6 per cent). The greatest number of worms recovered from any case was 14, and all worms found were of the species *Necator americanus*. Few of the infected ones presented any symptoms which could be attributed to hookworms, and the percentage of hæmoglobin in the infected cases was rather higher than in the noninfected.

Of 385 native women and children examined in Manila, 13 per cent were hosts of uncinaria. In the town of Las Piñas (5), Rizal Province, an examination of 6,000 people, completed by the Bureau of Health, September 30, 1909, showed 16.13 per cent infected with hookworms (males, 24 per cent; females, 8 per cent). A still more recent examination of 2,500 persons in the Cagayan valley showed 11.15 per cent of infection (males, 21 per cent; females, 9 per cent; children, 2 per cent).

The above figures from these widely separated localities in Luzon indicate that the infection for the general population of this island probably does not exceed 15 per cent, which is very low as compared with that in many other tropical countries; India showing from 65 to 83 per cent (2) and Porto Rico 90 per cent or more. This fact is surprising when one considers the habits of the natives, namely, careless disposal of excreta, bare feet, impure water supply. Furthermore, the agricultural pursuits of the inhabitants, combined with excessive moisture and rank vegetation, should, theoretically, lead to almost universal hookworm infection. The parasites seem to cause little disability among the Filipinos, and uncinariasis apparently is of slight economic importance here. This again contrasts sharply with conditions in Porto Rico. However, the disease is sufficiently common in the Philippines to lead to very general pollution of the soil and hence to the possible infection of white men.

OPPORTUNITIES FOR IMPORTATION FROM THE UNITED STATES.

The prevalence of uncinariasis among the inhabitants of the southern portion of the United States has been the subject of so much recent literature that I shall merely refer to the fact that the condition is extremely general throughout this region, many investigators, in large series of cases, having found 50 per cent of infections, and some claiming that 90 per cent of the rural population of certain sections is suffering from uncinariasis (11) (12) (14) (15) (16) (17).

The feature which especially pertains to my present subject is the prevalence of helminthiasis among United States soldiers, because the

great majority of the white men whom I have been able to study in the Philippines either are or have been in the military service.

The first work on the occurrence of uncinariasis among American soldiers who had never been outside of the United States, was done by Siler (6) in 1909, when he found that out of 108 southern recruits 93, or 85 per cent, were infected. Following this investigation, I studied the subject among recruits received at Jackson Barracks, near New Orleans, with the result that of the southern-bred recruits arriving at that station, 67 per cent were shown to harbor *Uncinaria americana* (7). Further work proved that among 100 southern-bred³ soldiers in their first enlistment period (three years) 60 per cent were infected, while among 33 men who had served more than one enlistment, only 11 per cent harbored the parasite. All of my cases were very mild infections and did not come from one section, every State in the South being represented. The details are shown in Table IV.

As this condition had hitherto been overlooked entirely, and consequently untreated, it follows that for ten years the Army had been bringing into the Philippines a continuous supply of men infected with the American hookworm. Perhaps we may facetiously call this one of our many ways of "Americanizing" the Islands. Just how many such men have come it is impossible to say, but there must have been several hundred annually. Southern-bred civilian employees of the Army and of the Insular Government have undoubtedly swelled these numbers.

This importation of uncinaria suggests the interesting question as to whether the United States was the origin of the American hookworm in the Philippines. All the early cases reported from here were diagnosed as the Old World species (notably Craig's 18 cases (8) referred to later). Recent reports as to both natives and whites, when they specify species at all, mention only the New World worm. However, it seems more reasonable to assume that the discrepancy is due to the limited knowledge of uncinaria which was possessed by most physicians ten or twelve years ago. Probably both species existed in the Islands, side by side, from the start, as is found to be the case in Panama (9).

The majority of the affected American soldiers return to the United States with their regiments in about two years. A few remain behind to fill civil positions and a few are transferred into other regiments just arriving in the Islands. It follows, therefore, that only a small minority of the Americans in the Philippines at any one time are likely to have

³ The term "southern-bred" in this article refers to those men who were born or had lived for a considerable time in some one or more of the following States: Maryland, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Texas, Kentucky, Tennessee, Arkansas, and Missouri.

infections which they brought from the homeland. In these, if reinfection is avoided, the worms gradually die out. My work with soldiers indicates that after a lapse of three years at least four-fifths of the hookworm carriers have freed themselves of their parasites. Somewhat similar results were obtained among infected soldiers in Cuba (20).

THE OCCURRENCE OF UNCINARIASIS AMONG AMERICANS IN THE PHILIPPINE ISLANDS.

Few of the soldiers recruited in the United States present any clinical evidence of uncinariasis and infections after arrival in the Philippine Islands should be comparatively rare, especially of late years, in view of the universal care exercised by the Army as to clothing, food, and water. Therefore, one would not expect to find hookworm disease widely prevalent among the Americans in the Islands. A study of the literature and statistics confirms this expectation.

While it is known that cases of *acchylostomiasis* were being detected during the early days of the American occupation (1898-1900), I can find no record of examinations, and the first available report is that of Strong in 1900 (22). Craig (8), in 1902, chronicled 18 cases found at the General Hospital in San Francisco among soldiers returning from the Philippine Islands. All of his cases seem to have been severe ones, and he states that the parasite in each instance was the Old World species.

In 1907 Cole (10) reported that since the organization of the Division Hospital at Manila, in 1898, the entire number of cases of uncinariasis among officers and men of the Regular Army in that institution had been 76. The total number of white admissions during this period is not stated and can not now be determined with accuracy, but it must have been over 25,000. This shows that uncinariasis was either very rare, or was rarely recognized. Of Cole's 76 cases, 38 were admitted for uncinariasis and 38 for other conditions, the ova of hookworm being found during the examination of the stools.

To determine what numbers of Americans of late years are showing infections with uncinaria, I have examined the records of the Division Hospital for the period from June 14, 1905, to January 29, 1910. A trifle over 8,200 white patients have been admitted and the ova of hookworms have been demonstrated in the *fæces* of 71, a rate of infection of considerably less than 1 per cent. Deducting the number of duplicate examinations made in the positive hookworm cases, there have been over 8,000 examinations of stools during the period in which the 71 cases of uncinariasis have been found. This shows its great infrequency. The details of the positive cases are shown in Table I.

As the Division Hospital is used mainly for the more serious and chronic cases of disease, it occurred to me that a larger proportion of infections with uncinaria among the white soldiers might be shown in the records of the Army posts, since there the simpler cases of disease would receive treatment and be cured. Therefore, I examined the records of Fort William McKinley, a brigade post 6 miles from Manila. For

the period from January 21, 1907, to January 25, 1910, there were found only 19 cases of uncinariasis, the admissions for the same period having numbered 11,544 persons, and the number of stool examinations (omitting repeated examinations) approximately 800. The percentage of patients found to be infected is, therefore, less than 0.2 per cent, this being about one-fifth of the rate at the Division Hospital. The percentage of stools showing ova of uncinaria was 0.9 per cent at the Division Hospital and 2.4 per cent at Fort William McKinley. (See Table II.)

The stools of 326 white patients were examined at the Civil Hospital in Manila, during the last half of 1909, and 16 cases of uncinariasis discovered, an infection rate of 4.8 per cent, which is very much higher than was found at the two hospitals referred to above. This hospital treats all classes of civilian employees who, on the average, probably take less care as regards shoes, food, and water than do the inmates of the military hospitals. The figures for the Civil Hospital were furnished by Doctor Ohno, of the Biological laboratory, Bureau of Science, Manila, P. I.

Of the 90 cases at the Division Hospital and at Fort William McKinley, only 11 (4 at the Division Hospital and 7 at Fort William McKinley) were admitted because of uncinariasis, the remainder of the cases having entered the hospital for other reasons, the ova being demonstrated upon the examination of the stools.⁴ Therefore we are justified in considering that uncinariasis, sufficiently marked to be detected either clinically or by the routine stool examination, is rare among Americans in and about Manila.

Probably, if an exhaustive examination was made of the stools, with uncinariasis alone in view, a somewhat larger percentage of infection would be found than is shown above. By an exhaustive examination is meant the complete search, if necessary, of 8 or 10 cover-glass preparations from each patient, or the employment of the specific gravity method described by Bass (16) (17). My own experience in Louisiana showed that in 28 per cent of the infections 2 or more cover-glass preparations had to be gone over to demonstrate the ova and sometimes 6 or 8 were examined before the first egg was discovered. As far as is known, the only work of this kind, on a large scale, which has been done in the Islands, was the examination of the Eighth Infantry at Camp Jossman, Guimaras, by Lieutenants Pinkston and McIntire, under the direction of Major Glennan (19). They examined 528 men and found 9 per cent infected with hookworms.

⁴Of the 76 cases of uncinariasis among officers and soldiers found by Cole at the Division Hospital from its organization in 1898 up to August, 1907, one half (38) were admitted for uncinariasis, and the histories of these 38 show gastro-intestinal disturbance in 32, of whom 21 had dysentery, 5 diarrhoea, and 1 sprue. Of the 38 men admitted for other conditions, in whose stools ova of uncinaria were found, all had gastro-intestinal symptoms (10).

CAUSES OF ADMISSION AND ASSOCIATED DISEASES.

A study of Tables I and II, pages 251-262, and 263, shows that the cause for admission in the 90 men harboring hookworms was uncinariasis in 11 cases, and for the remaining 79 as follows:

TABLE III.

Cause of admission.	Number of cases.	Cause of admission.	Number of cases.
Dysentery	24	Dengue	7
Diarrhoea	7	Malaria	4
Enteritis	6	Surgical	2
Sprue	6	Cardiac, organic	2
Gastritis	2	Tuberculosis	5
		Venereal	2
		Miscellaneous	9
		Unknown	3
Total gastro-intestinal	45	Total other than gastro-intestinal	34

It is notable that among 90 men found to have uncinariasis, gastro-intestinal troubles were the cause of 50 per cent of the admissions, the coexistence of dysentery and uncinariasis being especially common. This coincidence is possibly explained in part by the fact that the stools of diarrhoea and dysentery patients were thoroughly examined for the possible presence of amœbæ and the hookworm ova discovered accidentally, while the fæces of the patients having no enteric symptoms were not always examined and consequently mild cases of uncinariasis, without clinical signs, may frequently have escaped notice.

However, there are two other possibilities: First, that the presence of uncinaria lowered the vitality, thereby favoring the development of gastroenteric diseases, and, second, that the infection with hookworms occurred by mouth at the same time that the causes of dysentery gained entry. Study of the case histories throws no light on these points.

SYMPTOMATOLOGY.

It is unnecessary to describe the classical symptoms of hookworm disease as given in the textbooks. A review of the histories of the 71 cases at the Division Hospital proves that such a train of symptoms is rare in the class of patients this paper deals with. Anæmia was not at all a prominent symptom. In a few instances in which the hæmoglobin was estimated it was indeed low, ranging from 40 to 85 per cent, but in all these patients there were ample causes for anæmia other than the hookworm. Cole found that in his series anæmia, dyspnoea and œdema were not marked (10). Wolf was struck with the fact that the majority of patients in the Philippine Islands harboring uncinaria appeared to be in excellent health (6). Table III shows how commonly gastro-intestinal symptoms were associated with uncinariasis, and also that usually the

presence of an intestinal parasite was unsuspected until the stool examination showed ova. This is in accord with my experience at New Orleans, where uncinariasis was found extensively among men apparently in perfect health.

The few differential leucocyte counts which have been recorded at the Division Hospital in uncinariasis confirm my observations at New Orleans that an eosinophilia of over 5 per cent is the rule, but that figures as low as 1, 2, or 3 per cent are by no means infrequent and are valueless in excluding the diagnosis of hookworm disease (7).

WHERE THE AMERICANS IN THE PHILIPPINE ISLANDS CONTRACT THEIR
INFECTIONS WITH UNCINARIA.

About a year ago, in reporting my work in the United States, I expressed the opinion that when soldiers with uncinariasis (species not mentioned) returned from the Philippine Islands it was unsafe to assume that the infection had occurred in the Islands, as there was quite as much likelihood that these men had taken the worms from the United States and had returned with them still in the intestine. With the view of establishing or disproving this theory, I have investigated the residences of the 90 cases covered by this report. As the histories did not record the various places of residence of each patient, I obtained from the sick and wounded report cards and from the descriptive lists of the soldiers, whenever possible, the following data which I shall term "residential factors."

1. Place of enlistment or acceptance for enlistment.
2. Birthplace, giving State of the United States, or country, if not in United States.
3. Residence of the man's nearest relative.
4. Residence of the man himself as given at the date of enlistment.

In the cases of the soldiers at Fort William McKinley and most of the civilians, only the birthplace could be determined.

An analysis of these data shows that among the 90 cases of uncinariasis 44 were born in the southern portion of the United States, 41 elsewhere, and in 5 there is no record. In the case of each of the 44 men born in the Southern States for whom other "residential factors" could be obtained, it was found that at least one, and usually two, other factors designated the South. Therefore, it seems fair to assume that these 44 southern-born men, constituting 49 per cent of the cases of uncinariasis, were so definitely identified with the South that the infection of the majority of them with hookworm, while in that region, was highly probable.

In connection with southern birth and residence it is necessary to consider also length of service in the Army, because, under the good sanitary conditions prevailing in the military service within the limits of the United States, I assume that reinfection with hookworms must be extremely rare, and that, under such sanitary conditions, after five years' service the greater part of the soldiers who were infected at the date of their enlistment will have become free from the parasites by reason of the natural death of the worms. Looking over Tables

I and II with this point in mind, it is seen that 14 of the southern-born men (cases Nos. 7, 15, 19, 21, 23, 26, 29, 33, 34, 39, 44, 74, 77, 87)* had served in the Army five years or over at the date of current admission on sick report, and therefore had probably freed themselves of any original infection and had gained their present infection in the Philippines during this or a previous tour of duty.

Deducting these 14 long-service men from the 44 southern-born men, leaves 30 cases out of the 90 (33 per cent) in which it appears probable that the hookworm infection may have originated in the United States and have been imported into the Philippines. Of course it is impossible to prove that these men may not have received additional infections while in the Islands.²

There is, with one or two exceptions, nothing in the histories and residences of the 41 cases not born in the South, to indicate that the infection occurred elsewhere than in the Philippine Islands. Just how the worms gained entry into the intestines in these cases is an interesting subject for speculation.

It is rare for a civilian or a soldier in the peaceful times of the last few years to run much risk of contracting ground itch, since good shoes are universally worn, and the persons considered are not engaged in agricultural pursuits, or severe field service. Great efforts are made to provide safe drinking water and well-prepared food for all Americans, but that sufficient care in this respect is not always taken seems evident from the numerous cases of dysentery that continue to occur. In view of these facts, it seems probable to the writer that infection with hookworms among Americans in the Philippines occurs more commonly by mouth than through the integument.

IMPORTANCE OF TREATING MILD UNGINARIASIS.

Although this investigation shows that hookworm infections among Americans in the Philippines are rarely found and that such as are

* Since writing this article I have received some additional statistics from Camp Jossman. Out of 68 cases of uncinariasis (found between December 18, 1907, and March 19, 1908) in the Eighth Infantry, 16 were from southern States, a percentage of 24. Deducting 12 men with over five years' service, leaves only 4 cases, or 6 per cent of the total, in which it appears likely that the men brought their present infections from the United States, unless they were re-infected at their homes while on furlough. Out of 20 cases of uncinariasis in the Fourth Infantry, which relieved the Eighth at Camp Jossman (period from April 11, 1908, to December 14, 1909), 16 were from southern States, a percentage of 75. Deducting 5 long-service men, leaves 11 cases, or 55 per cent, in which there is a likelihood that their present infection originated in the United States. As the Fourth Infantry had newly arrived in the Islands (April 1, 1908), the high proportion of southern-born men found infected correctly indicates the influence of southern birth on uncinaria infection. The Eighth Infantry had been in the Islands about a year and a half when the first examinations were made and it shows no predominance of infection among southern-born men, which goes to indicate that a large proportion of these men were infected in the Islands during their two years of service.

I am indebted for these statistics to First Lieut. Alexander D. Parce, Medical Corps, United States Army.

encountered present little clinical evidence of the disease, I do not think that the importance of the condition should be underestimated. From observations on soldiers in New Orleans I concluded that while the light infections did not materially affect the efficiency of the man doing garrison duty at home, nevertheless, he was somewhat more energetic and felt better after the expulsion of the worms. It is probable that even a few parasites, by injuring the intestinal mucosa, by disturbing digestion, by secreting toxins, by producing a slight anæmia and by altering the normal proportions of the different varieties of leucocytes, usually at the expense of the polynuclears, must to some extent lower the vitality, thereby predisposing to various infections, especially in active military service. Even a slight lowering of vitality is of importance in the Tropics where the white man is confronted by so many serious diseases awaiting an opportunity to overcome his natural resistance. Therefore, in view of the ease of microscopic diagnosis and the success of vermifuge treatment, it seems desirable that all white residents of the Tropics should be examined at intervals to determine if they serve as the hosts for uncinaria. The importance of this is emphasized by the frequency with which uncinaria were found associated with gastro-intestinal diseases, especially sprue, diarrhoea, and dysentery, which are the arch enemies of the white man in the Tropics.

CONCLUSIONS.

1. Uncinariasis is found among the Filipinos in probably not over 15 per cent of the general population and is mild in type and of small economic importance.
2. The percentage of infections is higher in adult males, reaching 50 or 60 per cent among the Filipino Scouts and Bilibid prisoners.
3. The average percentage of infection of the white population of the southern part of the United States is probably much higher than the rate among the Filipinos.
4. From 65 to 85 per cent of the southern-bred white recruits for the United States Army are infected with uncinaria, usually mildly, and these infected soldiers have been coming in considerable numbers to the Philippines, thus importing *Uncinaria americana*.
5. The majority of these soldiers, if not reinfected, become free from the worms by natural processes in about five years.
6. Uncinariasis, sufficiently marked to be evident clinically, is very rare among American men in the Philippine Islands.
7. Even a routine stool examination among Americans shows few cases, 71 out of 8,000 examinations at the Division Hospital and 19 out of 800 examinations at the Fort William McKinley Hospital.
8. An exhaustive stool examination among Americans in the Philippine Islands would probably show a somewhat greater frequency.
9. Of the 90 cases of uncinariasis found at the above hospitals, only 11 were admitted for uncinariasis. Forty-five were admitted for gastro-

intestinal troubles, dysentery, diarrhoea, and sprue being the most frequent causes.

10. In 30 out of 90 cases (33 per cent) there is a probability that the infection originated in the United States and was imported into the Philippine Islands.

11. In the remaining 60 cases it is probable that infection occurred in the Philippine Islands, and there is reason to believe the parasites were usually introduced through the mouth with food or water.

12. Uncinariasis is of sufficient importance among Americans in the Islands to make an occasional careful search for ova desirable.

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TABLE I.—Cases of uncinuriasis at the Division Hospital, Manila, P. I., from June 14, 1905, to January 29, 1910 (during this period approximately 8,200 white patients were admitted).

(A) SOLDIERS.

Case No.	Age.	Years of service.	Place enlisted.	Birthplace.	Residence of near-estrictive.	Residence.	Occupation before present enlistment.	Cause of admission to hospital.	Years of P. I. service.	Remarks.
1	22	1	Montana	Alabama	Alabama	Alabama	Carpenter	Dengue	4	
2	31	4	Massachusetts	Massachusetts	Massachusetts	Massachusetts	Laborer	Tuberculosis	4	Died in California.
3	31	4	California	Indiana	Indiana	Army	do	Dengue	2	
4	23	2	Ohio	West Virginia	West Virginia	West Virginia	Miner	do	1	
5	21	2	do	do	Virginia	do	do	do	1	
6	27	23	Texas	Ohio	Ohio	Army	Soldier	Tuberculosis	1	
7	28	8		Virginia				Fever		
8	22	1	New York	New York	New York	New York	Driver	Enteritis	1	
9	21	2	North Carolina	North Carolina	North Carolina	North Carolina	Farmer	Malaria	1	
10	24	3	Ohio	Georgia	Georgia	Georgia	Tinner	Fever	2 1/2	
11	25	1	West Virginia	West Virginia	West Virginia	West Virginia	Farmer	Diarrhea	1	
12	22	3	Illinois	Montana	Montana	Montana	Clerk	Dysentery	1 1/2	
13	23	11	District of Columbia	Holland	New Jersey	Army	Soldier	Diarrhea	1 1/2	
14	25	3	California	Pennsylvania	Montana	do	do	Dysentery	1 1/2	
15	28	5	Alabama	South Carolina	South Carolina		Bridge builder	do	1 1/2	
16	26	1	Kansas	Illinois	Illinois	Illinois	Laborer	do	1	
17	31	3	New York	Ireland	New York	Army	Soldier	do	1	
18	25	2	Massachusetts	Massachusetts	Virginia	Massachusetts	Fireman	do	2	
19	32	7	Philadelphia	Montana	Montana		Soldier	do	3	
20	23	4	Kentucky	Kentucky	Kentucky	Kentucky	Farmer	Diarrhea	1	
21	35	14		Mississippi				Sprue	5	
22	23	2	West Virginia	Kentucky	Kentucky	Kentucky	Farmer	Tuberculosis	1 1/2	
23	26	6 1/2	New York	North Carolina	England	Tennessee	soldier	Bubo	3	Uncinaria americana.
24	35	8	Georgia	Ireland	New York	New York	do	Dysentery	3	

TABLE I.—Cases of uncinariasis at the Division Hospital, Manila, P. I., from June 14, 1905, to January 29, 1910 (during this period approximately 8,200 white patients were admitted).

(A) SOLDIERS.

Case No.	Age.	Years of service.	Place enlisted.	Birthplace.	Residence of nearest relative.	Residence.	Occupation before present enlistment.	Cause of admission to hospital.	Years of P. I. service.	Remarks.
1	22	1	Massachusetts	Albany	Albany	Albany	Carpenter	Dengue	8	Died in California.
2	31	3	Massachusetts	Massachusetts	Massachusetts	Massachusetts	Labourer	Tuberculosis	4	
3	31	4	California	Indiana	Indiana	Army	do	Dengue	2	
4	28	2	Ohio	West Virginia	West Virginia	West Virginia	Miner	do	3	
5	21	2	do	do	Virginia	do	do	do	3	
6	47	23	Texas	Ohio	Ohio	Army	Soldier	Tuberculosis	1	
7	28	8	do	Virginia	do	do	do	Fever	1	
8	22	1	New York	New York	New York	New York	Driver	Enteritis	1	
9	21	2	North Carolina	North Carolina	North Carolina	North Carolina	Farmer	Malaria	1	
10	24	3	Ohio	Georgia	Georgia	Georgia	Miner	Fever	23	
11	25	1	West Virginia	West Virginia	West Virginia	West Virginia	Farmer	Dysentery	1	
12	22	1	Illinois	Montana	Montana	Montana	Clerk	Dysentery	1	
13	22	1	District of Columbia	Holland	New Jersey	Army	Soldier	Dysentery	14	
14	26	3	California	Pennsylvania	do	do	do	Dysentery	4	
15	28	5	Alabama	South Carolina	South Carolina	do	Bridge builder	do	14	
16	26	1	Kansas	Illinois	Illinois	Army	Labourer	do	14	
17	31	4	New York	Indiana	New York	do	Soldier	do	4	
18	25	2	Massachusetts	Massachusetts	Massachusetts	Massachusetts	Fireman	do	2	
19	32	7	Philadelphia	Montana	Montana	do	Soldier	do	3	
20	23	4	Kentucky	Kentucky	Kentucky	Kentucky	Farmer	Dysentery	1	
21	35	14	do	Mississippi	do	do	do	Syphilis	6	
22	23	2	West Virginia	Kentucky	Kentucky	Kentucky	Farmer	Tuberculosis	14	
23	26	6	New York	North Carolina	England	Tennessee	Soldier	Bubo	3	Leishmania americana.
24	25	5	Georgia	Ireland	New York	do	do	Dysentery	3	

TABLE I.—Cases of *uncinariasis* at the Division Hospital, Manila, P. I., from June 14, 1905, to January 29, 1910, etc.—Continued.

(A) SOLDIERS—Continued.

Case No.	Age.	Years of service.	Place enlisted.	Birthplace.	Residence of near- relative.	Residence.	Occupation before present enlistment.	Cause of admission to hospital.	Years of P. I. service.	Remarks.
25	33	2½	Wisconsin	Wisconsin	Wisconsin	Wisconsin	Bookkeeper	Dysentery	12	<i>Uncinaria americana</i> .
26	36	6½	Mississippi	Mississippi	do	Army	Soldier	Gastritis	14	Do.
27	42	18	New York	Sweden	New York	do	do	Dysentery	13	
28	33	8	Washington	Wisconsin	Wisconsin	Wisconsin	do	Fever	2½	
29	50	10	West Virginia	West Virginia	West Virginia	West Virginia	do	<i>Uncinariasis</i>	1½	<i>Uncinaria americana</i> ; probably other P. I. service.
30	37	15	New York	Ireland	Illinois	Illinois	do	do	1½	<i>Uncinaria americana</i> .
31	23	1	Tennessee	Tennessee	Tennessee	Tennessee	Laborer	Diarrhea	1	
32	35	12	Ireland	Ireland	Ireland	Ireland	Soldier	Enteritis	5	7 months in Porto Rico.
33	33	11	Kansas	Kansas	Kansas	Army	do	Syphilis	14	
34	32	9	Alabama	Alabama	Alabama	Alabama	do	Gastritis	1	
35	34	6	Texas	North Carolina	North Carolina	North Carolina	Soldier	Hepatitis	2	<i>Ankylostoma duodenale</i> ?
36	19	1	Louisiana	Louisiana	Louisiana	Louisiana	Student	Diarrhea	1	
37	34	10	Colorado	Ireland	Pennsylvania	Colorado	Soldier	Enteritis	2	
38	25	12	Texas	Kentucky	Kentucky	Army	do	Diarrhea	1	
39	26	5	do	Georgia	Georgia	do	do	Dengue	1	
40	40	16	Scotland	Scotland	England	England	do	Syphilis	1	
41	24	1	Alabama	New Jersey	New Jersey	Alabama	Engineer	<i>Uncinariasis</i>	1	<i>Ankylostoma duodenale</i> ; lived in Panama.
42	18	¾	Kentucky	Kentucky	Kentucky	Kentucky	Teamster	Fever	1	
43	22	2	do	do	do	do	Farmer	Malaria	1	
44	31	10	Utah	do	Maryland	Army	Soldier	Dysentery	4½	
45	30	7	Illinois	Illinois	Illinois	do	do	Syphilis	¾	
46	24	2	Illinois	do	do	Illinois	Barber	Jaundice	1½	

47	22	11	Philippine Islands	New York	New York	Army	Soldier	Cardiac	3	Organic lesion.
48	26	3	California	Georgia	Georgia	Georgia	Railroad	Tuberculosis	6	Ulcer in Philippine Is-
49	40	17	do	New York	do	Army	Soldier	Dysentery	7	lands.
50	25	2	Illinois	Indiana	Illinois	Illinois	Clerk	Enteritis	2	
51	28	6	Illinois	Illinois	Army	Soldier	Cardiac	Cardiac	34	Organic lesion.
52	25	4	Virginia	New Hampshire	do	do	do	Enteritis	1	
53	23	2	Texas	Texas	Texas	Telegrapher	Telegrapher	Dysentery	4	
54	20	2	Kentucky	Kentucky	Kentucky	Motorman	Motorman	Dysentery	1	
55	22	2	Florida	Georgia	Georgia	Painter	Painter	Dysentery	14	
56	24	8	Minnesota	Norway	Army	Soldier	Soldier	Fever	21	
57	31	2	Pennsylvania	Tennessee	Tennessee	Clerk	Clerk	Dysentery	13	
58	33	2	Kentucky	Kentucky	Kentucky	Farmer	Farmer	Sprue	24	

TABLE I.—Cases of uncinariasis at the Division Hospital, Manila, P. I., from June 14, 1905, to January 29, 1910, etc.—Continued.

(B) CIVILIANS.

Case No.	Age.	Birthplace.	Residence of nearest relative.	Occupation in the Islands.	Cause of admission to hospital.	Years of P. I. service.	Remarks.
59 30		New York	New York	Quartermaster employee.	Malaria	9	
60 32		Kansas			Tuberculosis		
61 32		Ohio.	Pennsylvania		Uncinariasis		
62 43		New Jersey	Montana.	Teamster	Spine	5	Ankylostoma duod.
63					Dysentery		
64					do.		
65 26		Florida	Florida	Carpenter	do.	5	
66 40		Washington	Washington		Migraine		
67 29		Denmark			Dysentery		
68 27		Massachusetts	Massachusetts		Spine		
69 39		Illinois	Canada		Dermatitis		
70 47		Virginia			Dysentery		
71 28		Ohio			Hemorrhoids.		

Total, 71 cases.

Seventy-one cases of uncinariasis among 8,200 patients is a proportion of 0.87 per cent.

The number of stool examinations during this period was over 8,000, and of these examinations 9.9 per cent showed ova of uncinaria.

No mention is made of the species of worm except in the cases noted in "remarks."

In the case of recruited men the occupation is usually given as "soldier" without regard to the occupation he may have had before his first enlistment.

TABLE II.—Cases of uncinariasis recorded at Fort McKinley, P. I., from January 21, 1907, to January 26, 1910 (during this period 11,544 patients were admitted).

Case No.	Age.	Years of service.	Birthplace.	Cause of admission to hospital	Remarks.
72	23	2	Kentucky	Agchylostomiasis	
73	23	2	do	Malaria	
74	39	11	North Carolina	Dysentery	
75	23	3	Kentucky	do	
76	23	11	Ohio	do	
77	35	7	Georgia	Agchylostomiasis	
78	23	2	Italy	do	
79	23	1	Tennessee	Dysentery	
80	22	2	do	Uncinariasis	
81					No records.
82	24	3	New York	Dysentery	Do.
83	22	1	West Virginia	Dengue	
84					Do.
85	26	1	Texas	Agchylostomiasis	
86					
87	34	12	Alabama	Dianthra	
88	22	7	Hungary	Uncinariasis	
89	24	1½	Russia	do	
90	37	16	Ireland	Sprue	

Total, 19 cases.

Nineteen cases of uncinariasis among 11,544 patients is a proportion of less than 0.2 per cent.

The number of stool examinations made during this period was 800, and of these examinations 2.4 per cent showed ova of uncinaria.

TABLE IV.—Showing the character of the cases of uncinariasis being imported into the Philippine Islands. Details are given of 60 cases of uncinariasis found among 100 unselected southern-bred white soldiers, who were in their first enlistment and had never been outside of the United States.

Case No.	Age.	Height.	Weight.	Occupation at time of enlistment.	Occupation previous to enlistment.	Birthplace.	Residence before enlistment.	History of ground itch. ^a	Years since ground itch.	Color.	Hæmoglobin.	Polynuclears.	Eosinophiles.	Lymphocytes, small.	Lymphocytes, large.	Transitionals.	Mast cells.	Number of ova found in stools.	Number of worms found after treatment.
1	22	66	134	Farmer	Farmer	Mississippi	Mississippi	N.	—	Good	100	62.0	6.5	22.0	7.0	2.5	0	Many	18
2	21	68	133	do	do	do	do	P.	12	do	100	61.5	8.5	18.5	3.5	2	1	do	42
3	23	69	135	Plumber	None	South Carolina	Alabama	P.	14	Pale	90	54.5	2	15	3.5	5	0	Few	0
4	18	66	127	Factory	Farmer	Mississippi	North Carolina	P.	14	Good	100	44	26	22	4	4	0	do	3
5	24	68	145	Farmer	do	do	Mississippi	P.	14	Pale	80	46	7	26	11.5	9.5	0	do	17
7	19	66	118	Laborer	Laborer	do	do	?	—	Good	90	40	20.5	25.5	4	5	0	Very few	?
8	23	66	126	Collector	Farmer	Georgia	Louisiana	P.	15	do	90	60.5	7.5	20	7	4.5	0.5	?	33
9	20	66	126	Lumber	do	Texas	Mississippi	P.	9	do	90	63	11	17	6	3	0	Many	10
10	28	68	163	Engineer	do	Alabama	—	P.	20	do	80	47	8.5	32	7	5.5	0	Very few	2
11	22	69	144	Farmer	do	do	Alabama	P.	12	Fair	80	69	7	15.5	4	8.5	1	Very many	12
12	27	66	130	Carpenter	do	Mississippi	Mississippi	P.	18	Pale	90	62.5	15	9.5	3.5	9	0.5	Few	5
14	23	72	151	Barber	do	Florida	Louisiana	P.	7	Fair	80	51.5	17	23	2.5	5	1	Very many	?
15	18	67	130	Laborer	do	West Virginia	do	N.	—	Pale	90	49	11	28.5	5.5	5	1	Very few	0
16	26	67	129	do	do	Alabama	Alabama	P.	20	Good	90	68	5	23	2.5	1.5	0	Few	1
17	29	69	162	Factory	do	do	do	P.	5	Pale	80	71.5	4.5	18	3	2	1	do	?
18	23	72	150	Farmer	do	Georgia	Georgia	P.	15	Good	80	65	10.5	14	3.5	6.5	0.5	Very many	?
20	23	72	147	Stable	do	Alabama	Alabama	P.	12	Pale	100	66	4	20	6	2	0	do	0
22	21	64	126	Mechanic	do	Louisiana	Louisiana	P.	12	Good	100	58.5	6.5	29	4.5	2.5	0	Very few	16
23	22	70	152	do	do	North Carolina	Panama	N.	—	Excellent	100	60	7	35	5	2	1	Many	1

25	27	71	150	Laborer	do	Texas	Texas	N.	Good	90	81	5	70	2.5	0.3	0	do	24
26	21	69	157	Farmer	Logging	Mississippi	Mississippi	P.	8	100	10.5	8.5	16.5	2.5	2.5	0.5	Few	1
28	21	71	154	Milk man	Farmer	North Carolina	do	P.	10	90	50	23	15	8	1	0	do	2
31	19	70	149	Laborer	do	Mississippi	do	N.	do	60	73	6	12	3	2	0	Very many	5
32	23	70	157	Farmer	do	Louisiana	Louisiana	N.	do	80	54	26	13	3	2	2	Very few	7
33	28	69	138	do	do	North Carolina	North Carolina	P.	14	100	46	10	25	9	5	2	Few	12
34	13	69	125	do	do	Alabama	Alabama	N.	Fair	90	40	10.5	23.5	5	5.5	0.5	Very many	11
35	21	68	120	Laborer	do	Louisiana	Louisiana	N.	Good	90	83.5	7	38.5	11.5	15.5	0	do	75
41	27	67	148	Farmer	do	Maryland	Maryland	N.	do	90	70	6	14	4	6	0	Very few	1
42	22	67	138	Showman	do	Kentucky	Kentucky	N.	Pale	100	65	2	22	5	6	0	do	1
45	23	68	148	Piceman	do	Mississippi	Mississippi	N.	Good	90	56	4	31	7	2	0	Many	2
47	21	67	136	Farmer	N. R. laborer	do	do	P.	7	100	65	7.5	24	2.5	2	0	Many	82
48	23	69	181	Fireman	Farmer	do	do	P.	10	100	64	6	23	4	3	0	Many	85
50	29	70	156	Engineer	do	Alabama	do	P.	7	90	33.5	7.5	29.5	4	5.5	0	Very few	35
51	19	65	145	Farmer	do	do	do	P.	4	90	42.5	5	37	7.5	4	1	Many	13
52	22	66	115	do	do	do	do	N.	do	100	68	4	36	1	1	0	Very few	7
53	26	69	140	Laborer	do	do	do	P.	12	100	68	4	36	1	1	0	Very few	7
54	29	68	114	Smith	do	Mississippi	do	N.	do	100	62.5	4.5	26.5	2.5	3.5	0.5	Few	4
57	19	63	148	Canning	Canning	Texas	Louisiana	N.	do	90	69	7	25	4	5	0	do	0
58	28	70	128	Fireman	Farmer	Louisiana	Mississippi	P.	2	90	60.5	2.5	25.5	2.5	3	0	do	55
60	25	70	135	Sawmill	do	Mississippi	do	P.	13	100	68	6	32	15	17	0	Many	13
62	31	65	113	Lumbering	do	do	do	N.	do	100	68	8	24	8	2	0	Many	11
63	23	69	136	Pile driving	do	Florida	Louisiana	N.	do	90	65	5	24.5	1.5	3	0	do	11
65	29	65	138	Machinist	do	do	Florida	P.	4	90	54	6	32.5	3	3	0	do	32
65	22	69	132	Express	Express	Texas	Texas	N.	Fair	90	55	5	26	5	7	0	Very few	18
68	23	66	146	Clerk	Farmer	Alabama	Alabama	N.	Good	90	53	5	26	5	7	0	Few	18
69	23	69	130	Farmer	do	Louisiana	Louisiana	N.	do	90	59	13	23	2	5	1	do	10
70	22	70	151	Logging	do	Mississippi	Mississippi	P.	8	90	49	11.5	28	6	5	0.5	do	1
72	26	70	161	Laborer	Farmer	Georgia	Georgia	N.	do	200	62	5	23	5.5	4.5	0	Very few	18
73	21	68	151	Coal miner	Lived on farm	Alabama	Alabama	N.	do	200	52	5	17	3	6	0	Many	27

* The average hemoglobin in the 60 infected men was 91 per cent, and in a series of 53 noninfected southern soldiers it was 94 per cent.

The average eosinophil count in 60 infected cases was 8.5 per cent, and in a series of 53 noninfected southern soldiers it was 94 per cent.

N. means negative history for ground fish; P. means positive history for ground fish.
 If 1 for 2 are were found per cover-glass, the record was "few." If at least 2 cover-glasses were gone over before the first egg was found the record was "very few."

TABLE IV.—Showing the character of the cases of uncinariasis being imported into the Philippine Islands, etc.—Continued.

Case No.	Age.	Height.	Weight.	Occupation at time of enlistment.	Occupation previous to enlistment.	Birthplace.	Residence before enlistment.	History of ground itch.	Years since ground itch.	Color.	Hæmoglobin.	Polynuclears.	Eosinophiles.	Lymphocytes, small.	Lymphocytes, large.	Transitionals.	Mast cells.	Number of ova found in stools.	Number of worms found after treatment.
75	19	67	132	Laborer	Laborer	Mississippi	Mississippi	P. 5	Pale	P. 100	P. 82	P. 6	P. 8	P. 1	P. 1	P. 0	P. 0	Very many	77
78	21	70	160	Cotton mill	Farmer	Alabama	Florida	P. 7	Fair	100	62	4	26	6	2	0	0	Few	75
79	22	69	137	Fireman	Schooler	Mississippi	Mississippi	P. 12	Good	100	83	4.5	33	4.5	5	0	0	Very many	98
81	25	68	139	Lumbering	Farmer	Alabama	Alabama	P. 15	do	100	54	1	27.5	10	7.5	0	0	Very few	1
82	23	65	165	do	do	do	do	P. 11	do	90	46	11	31	4.5	3.5	2	0	do	8
83	23	68	182	Electrician	Electrician	do	do	N.	Fair	90	24.5	13.5	57	5	3	1	1	Very many	38
86	23	61	123	Laborer	Laborer	Mississippi	Mississippi	N.	do	80	45.5	3.5	35	10.5	3.5	0	0	Very few	5
87	28	74	175	Farmer	Farmer	do	do	P. 10	Good	100	35.5	7	42.5	9	5	1	1	do	15
93	24	63	137	Mill man	do	do	do	P. 10	do	100	38	12	47	1	1	1	1	Very many	24
96	23	65	138	Brakeman	Mill hand	North Carolina	South Carolina	P.	do	100	62.5	8	24.5	4	6	0	0	Few	10
97	22	66	140	Citrus man	Farmer	Texas	Louisiana	N.	Pale	80	56	12.5	28	1.5	1	1	1	do	0

THE PREVALENCE OF INTESTINAL PARASITES IN RIZAL AND CAVITE PROVINCES AND IN CAGAYAN VALLEY.¹

By R. S. RISSLER² and LIDORIO GOMEZ.³

Shortly after the completion of the medical survey of the town of Taytay,⁴ the Bureau of Health organized a campaign for the purpose of examining and treating the natives of certain provinces infected with intestinal parasites, with the especial view of determining the prevalence of hookworm infection and its relation to the public health.

The first headquarters of this field party was located at Las Piñas, in the Province of Rizal. The town has a sandy soil and is situated by the seaside. When the work was completed there, the field party was sent to the Cagayan Valley, having its headquarters at Tuguegarao, Cagayan Province, an inland town about 100 kilometers from the mouth of the Cagayan River. Later it was located at Santa Isabel, a hacienda of the Compañía Tabacalera, in the municipality of Ilagan, Isabela, about 60 kilometers further inland from the mouth of the river.

It was found necessary to treat all patients affected with disease in order to induce large numbers of the people to come to the dispensary. Hence, many who were examined for intestinal parasites were found to be suffering from other diseases. The results obtained are based upon the examination of one single cover-glass preparation, but in a few doubtful cases two or three such preparations were examined. Most of the stools studied were passed on the day the examination was performed, but a few were passed the day before. In the beginning of the work an attempt was made to administer magnesium sulphate, but as a rule the patients, after accepting their medicine, never came back, and later the plan of previously administering purgatives was given up entirely.

Babies under 1 year of age were not included in the examinations, as at the beginning of the work it was noted that the stools of those examined were negative, their food being chiefly mother's milk.

¹ Read at the biennial meeting of the Far Eastern Association of Tropical Medicine, held at Manila, March 12, 1910.

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⁴ *This Journal*, *Sec. B* (1909), 4, 207.

The present report covers the period from June, 1909, to February 8, 1910, during which time the party was in the field. Further work is being pursued in the districts near at hand and this will be reported upon when the studies are completed.

About three-fourths of the cases examined at Las Piñas resided in other towns of Cavite and Rizal Provinces. The principal occupations of the people are fishing and working in the rice paddies and salt beds. The same may be said of the majority of inhabitants coming from other towns of these provinces, although in the latter the percentage of the people that do not actually work on the farm or at the fisheries or salt beds is greater, many of them being of the wealthier classes, such as landowners and merchants, while others are employed at the navy yard and railroad.

Many of the people examined in Tuguegarao, such as landowners, merchants, employees, and school children, did not actually work on the farm. The great majority of the inhabitants of the Cagayan Valley are much more ignorant than those of the provinces situated nearer to Manila and hence they hesitate more in submitting to medical treatment than do the enlightened classes. It should be emphasized that the majority of the enlightened Filipinos, and consequently those having greater confidence in scientific medical treatment, do not, as a rule, work on the farm.

The actual working class in the hacienda of Santa Isabel was examined, and in this investigation the field party was greatly assisted by the manager and the municipal officer.

The people here are almost entirely occupied in planting and cultivating tobacco, and for this purpose much field work is necessary. The men plow the land and with the women do the planting. When the tobacco stalks are sufficiently large, men, women, and the older children examine every plant in order to rid it of any worms present. Consequently, during the whole season of growth the workers are almost constantly in the fields. The soil consists of loose clay.

INFECTIONS WITH ASCARIS.

Contrary to the findings of Garrison⁵ at Bilibid Prison, we found *Ascaris lumbricoides* to be the most prevalent intestinal parasite. In Las Piñas, 77.21 per cent of the whole population is infected; in Tuguegarao, 73.51 per cent, and in Santa Isabel, 60.59 per cent. The infection is greatest among children and greater in adult females than in adult males, as is shown by the examinations made at Santa Isabel, namely, 70.58 per cent in children, 53.31 per cent in females, and 51.09 per cent in males.

INFECTIONS WITH TRICHURIS.

Garrison⁶ found this infection to be the most frequent in his 4,106 cases in Bilibid Prison. However, we found it to be second to *Ascaris*. This difference may be due to the fact that Garrison's statistics in Bilibid Prison are based for the greater part on an adult male population. In

⁵ *This Journal*, Sec. B (1908), 3, 191.

⁶ *Ibid.*, 197.

Las Piñas, 53.40 per cent of all the cases examined were infected, and 25.90 per cent in Tuguegarao. However, the number of cases infected with *Trichuris* in Santa Isabel fell much below the average, being only 6.23 per cent.

INFECTIONS WITH HOOKWORMS.

Hookworm infection was found to be third in frequency in the examination for intestinal parasites. In Las Piñas 11.14 per cent of all the cases examined were infected; in Tuguegarao, 8.01 per cent. In Santa Isabel we found the highest percentage of infection in all our work, 45.38 per cent.

The adult males show the highest rate; 20.91 per cent in Las Piñas, 13.52 in Tuguegarao, and 60.58 per cent in Santa Isabel. Adult females are less infected; 9.45 per cent in Las Piñas, 8.05 per cent in Tuguegarao, and 51.26 per cent in Santa Isabel. Children are infected to a much lesser degree; 2.63 per cent in Las Piñas, 3.66 per cent in Tuguegarao, and 26.42 per cent in Santa Isabel.

The strikingly high percentage of infection in Santa Isabel may be due to the occupation of the people, which requires almost constant exposure of their bare feet to the soil in the fields while caring for the tobacco plants. Again, the population is concentrated in a single spot on the hacienda. The soil, being clayey, is not particularly favorable to this infection.

We noticed fissures on the plantar surface of the feet in many individuals found harboring the hookworm, but these did not appear to cause any discomfort except an occasional itching sensation. Upon examination we were not able to demonstrate any embryonic form of the hookworm in these lesions. However, on account of the discovery of these fissures on the feet and the greater prevalence of the hookworm in adult males, although we have found no evidence of *Uncinaria dermatitis*,⁷ we are inclined to think the skin transmission is an important means of infection with this parasite.

Clinical symptoms.—Cases exhibiting typical symptoms of uncinariasis are rare. A few persons have complained of discomfort in the abdominal region which has been relieved entirely by treatment which resulted in the expulsion of the hookworms. Several cases in the Santa Isabel hacienda were picked out by the manager as being typically lazy, but upon examination they were not found to harbor this parasite. One of these cases showed emaciation together with great pallor of the conjunctive, without any history of malaria or tuberculosis. The examination of the blood in general demonstrated an increase of the eosinophile leucocytes. The absence of clinical symptoms was probably due to the paucity of the infecting worms. In most cases only five or ten were expelled after treatment, in others only two or three.

⁷ Stelwagon, Henry W. Philadelphia and London, 5th ed. (1907), 1109.

INFECTIONS WITH STRONGYLOIDES.

The distribution of this parasite varies according to the locality. Garrison⁸ in 1908 found 3 per cent infected among the Bilibid prisoners. In 1901 Strong⁹ reported 13 cases of *Strongyloides* (0.6 per cent) among 2,179 persons examined in the Philippines. We found 135 persons infected (2.24 per cent) in Las Piñas, but not a single case in Tuguegarao and Santa Isabel.

INFECTIONS WITH OXYURIS.

The statistics regarding this parasite can not be accurate, for we depend for its diagnosis upon the finding of the egg which is laid outside the anus and which often does not appear with the faeces. We found 4.95 per cent in Las Piñas, 2.62 per cent in Tuguegarao, and 1.24 per cent in Santa Isabel.

INFECTIONS WITH AMEBÆ.

Previous examinations of stools made in the Philippines have shown a high percentage of *Amœbæ*, varying from 20 to 70 per cent. Gilman¹⁰ reported 32 cases showing active amebic ulcerations out of 100 autopsies at the Philippine Medical School. Musgrave and Clegg¹¹ found 26 per cent and Garrison¹² 23 per cent of the inmates of Bilibid Prison infected. Garrison, Leynes and Llamas¹³ found 2.7 per cent in Taytay.

Our figures are still lower, we having found but 0.39 per cent infected in Las Piñas. Nearly all of these were free from clinical symptoms. In Tuguegarao and Santa Isabel we did not find a single case of infection and a typical stool with blood and mucus was not seen.

INFECTIONS WITH FLAGELLATES AND CILIATES.

In Las Piñas we found 3.88 per cent infected with monads and 0.14 per cent with *Balantidium coli*. In Tuguegarao 3.73 per cent with monads and in Santa Isabel 1.49 per cent. Neither the *Balantidium coli* nor any other ciliate was found in these two places.

INFECTIONS WITH TAPEWORMS.

Tœnia saginata was most frequently found. Only 4, or 0.06 per cent, out of 6,000 cases examined at Las Piñas were infected with tapeworm. In Tuguegarao the percentage is eight times higher, 0.50 per cent, and in Santa Isabel twenty times, 1.37 per cent. The high percentage in

⁸ *This Journal, Sec. B* (1908), 3, 201.

⁹ Report of the Surgeon-General, United States Army (1901), 203.

¹⁰ *This Journal, Sec. B* (1908), 3, 217.

¹¹ *Ibid.* (1906), 1, 909.

¹² *Ibid.* (1908), 3, 200.

¹³ *Ibid.* (1909), 4, 257.

these places may possibly be due to the importation of European cattle by the Compañía Tabacalera. We did not find a single case of infection with *Tenia solium* among the natives. Only one instance of the infection was encountered in a Spaniard in Cabagan, Cagayan, and this has not been recorded.

HYMENOLEPIS.

The previous reports on *Hymenolepis* have been meager. Garrison¹⁴ found five infections in his Bilibid cases. The Taytay field party does not record a single case.¹⁵ However, in Tuguegarao we found 0.26 per cent infected in adults and 0.46 per cent in children; in Santa Isabel, 1.73 per cent in children and 0.36 per cent in adult males. The majority of the cases had no clinical manifestations of disease, a few showed diarrhoea with mucus.

FLUKES.

Thus far in our work in these provinces we have found no flukes, either in the blood or sputum examined.

SUMMARY.

The result of our work is in accord with that of other authors regarding the almost universal infection of the whole population of the Philippine Islands with intestinal parasites.

The chief infections in the districts covered by this report are from *Ascaris* and *Trichuris*, and their distribution is rather uniform, although in Santa Isabel the percentage of infection with *Trichuris* fell very low.

The distribution of the hookworm varies, Santa Isabel showing the highest percentage ever recorded in the Islands. Males were more affected than females. The percentage of hookworm infection does not appear to be affected by the nature of the soil on which the people live.

The distribution of *Amoeba* shows still greater variation. In and around Manila the percentage of infection is higher, but in the Cagayan Valley it is rather low.

Infection with *Hymenolepis*, while not found in Cavite and Rizal Provinces, is rather frequent in the Cagayan Valley. Children are mainly infected.

Tapeworms are also more frequent in Cagayan and Isabel than in Cavite and Rizal.

The parasite known as the worm of Cochin-China diarrhoea, or *Strongyloides intestinalis*, was not found in Cagayan and Isabel, whereas it was quite frequently encountered in Cavite and Rizal.

¹⁴ *Ibid.* (1908), 3, 205.

¹⁵ *Ibid.* (1909), 4, 257.

Monads were found rather uniformly distributed in the cases, but ciliates were not encountered in the Cagayan Valley.

The results of these investigations are given in Tables I, II and III.

TABLE I.—*Santa Isabel.*—January 20 to February 8, 1910.

Examinations and infections.	Males.		Females.		Children.		Total.	
	No.	Percent.	No.	Percent.	No.	Percent.	No.	Percent.
Cases examined.....	274		238		288		802	
Positive.....	231	84.46	201	84.43	258	89.56	692	86.28
Negative.....	43	15.54	37	15.55	30	10.44	110	13.72
Cases infected with—								
Hookworm.....	166	60.58	122	51.26	76	26.42	364	45.38
Ascaris.....	140	51.09	127	53.31	219	70.58	486	60.59
Trichuris.....	74	5.10	26	10.92	10	3.43	50	6.23
Oxyuris.....	3	1.09	2	0.88	5	1.73	10	1.24
Monads.....	6	2.18	2	0.88	4	1.38	12	1.49
Hymenolepis.....	1	0.36	0	0	5	1.73	6	0.74
Tenia.....	3	2.92	3	1.26	0	0	11	1.37

TABLE II.—*Tuguegarao, November and December, 1909.*

Municipalities.	Number of cases.	Males.	Females.	Children.	Ascariis.	Trichuris.	Hookworms.			Mounds.	Oxyuris.	Hyemolophes.			Positives.	Negatives.
							Males.	Females.	Children.			Adults.	Children.	Tenia.		
Tuguegarao.....	2,218	896	674	1,018	1,084	578	100	39	38	177	89	60	2	11	9	1,045
Parito.....	103	56	17	21	62	48	4	4	0	8	7	2	0	0	0	92
Solana.....	91	38	16	26	45	26	8	6	0	8	4	2	1	3	08	29
Cataagan Viejo and Nuevo.....	88	38	25	25	61	24	4	0	1	8	9	0	0	0	73	15
Pesabana.....	21	8	4	3	2	8	0	1	0	1	1	0	0	0	0	13
Iguig.....	19	6	0	13	9	8	0	0	0	1	0	0	0	0	0	4
Aleuid.....	6	6	0	6	4	3	1	0	0	1	0	0	0	0	0	0
Abulog.....	4	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0
Amuhug.....	2	2	0	0	1	1	1	0	0	1	0	0	0	0	1	2
Tomo.....	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0
Calapanjagan.....	2	0	2	0	2	2	0	0	0	0	0	0	0	0	0	0
Other towns.....	38	25	7	3	21	9	2	0	0	2	1	1	0	0	0	9
Total examinations.....	2,694	997	576	1,116	1,907	672	122	44	42	208	97	68	7	12	13	1,068
Total percentage.....	100	31.81	21.04	44.17	73.55	25.90	18.52	8.05	8.66	8.00	3.73	2.62	0.96	0.47	0.50	71.13
																55.87

TABLE III.—*Report of the hookworm field party at Las Pitas, Rizal, as to the prevalence of intestinal-parasite-infection during the months of June, July, August and September, 1909.*

Municipalities.	Examination.	Hookworm.													Total hookworm.						
		Males.	Females.	Children.	Total.	Males.	Females.	Children.	Ascaris.	Trichuris.	Strongyloides.	Monads.	Amoeba.	Oxuris vermicularis.		Balantidium coli.	Tenia.	Blood.	Pus.	Mucus.	Positives.
Las Pitas.	1,720	587	734	389	1,670	115	68	9	1,285	1,124	59	82	10	122	4	2	19	15	18	1,569	151
Bacoor.	1,227	385	567	275	1,145	89	47	9	969	584	21	47	5	59	2		4	2	7	1,095	132
Imus.	1,147	261	406	480	1,147	66	47	17	574	402	11	35	1	20	2		9	1	20	936	154
Paranaque.	649	231	265	138	70	47	27	2	539	438	33	89	6	64	1		6	6	6	622	27
Cavite Viejo.	356	114	148	94	356	20	13	2	279	171	4	9	1	14	1		1	1	2	320	36
Pasay.	269	96	117	36	30	19	11	2	202	135	3	6	1	6	1		1	1	1	238	31
Binacayan.	127	34	64	32	10	2	6	2	95	75	3	3		5			2	1	1	118	9
San Francisco Ma- labon.	106	37	50	19	17	11	6	1	74	47	2	2		1			1	2	2	94	12
Dasmariñas.	84	20	40	24	15	7	7	1	52	24	4	4					1	1	70	14	
Cavite.	66	21	29	16	4	3	1	1	46	38				5		2	1		59	7	
Manila.	49	9	36	4	5	2	3	3	30	28		1							2	49	9
Tanay or Santa Cruz Malabon.	52	14	22	16	6	3	3	3	36	28				1						42	10
Salinas.	45	21	18	6	8	2	1	1	37	23		1		1					1	42	3
Novelita.	37	16	10	11	6	3	3	3	27	16		2		1						32	5
Nate.	16	5	9	2	2				11	7										14	2
Shang.	6	5	1	1	1	1	1	1	4	2							1	1		6	5
Caridad.	3	2	3	3	1	1	1	1	5	2		1								8	3
Pasig.	3	3	2	2	1	1	1	1	2	2										8	3
Malibay.	3	1	2	2	1				2	2										3	3
Taguig.	3	1	2	2	1				2	1										3	1
San Juan.	2	1	1	1	2	1	1	1	2	2										2	2
																				100.00	

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[illegible]

MYZOMYIA ROSSII AS A MALARIA-CARRIER.¹

By W. T. DE VOGEL.²

It has several times been pointed out that malaria frequently occurs in the Dutch East Indies near the seacoast; yet the fact remains that an anopheline species which develops in brackish and salt water, and even in concentrated sea water, and which has been found along the coast, can not be accepted as a satisfactory explanation of this phenomenon without further proof, for this particular anopheline is *Myzomyia rossii* Theob., and many writers allege that it does not seem to be capable of transmitting malaria.³

Giles⁴ says that according to Daniels, of Calcutta, *Myzomyia rossii* can not be infected either with tertian gametes or with crescents. Theobald states the same thing.⁵

Dönitz⁶ writes that Ross experimented in vain with this species and that the researches of Stephens and Christopher show that it has nothing to do with malaria.

In a report of the Wellcome Research Laboratories⁷ the statement is made that "not every anopheline can carry malaria, as witness *Myzomyia rossii* in India."

Also Galli Vallerio and Rochaz de Jong⁸ mention that this species does not appear to be able to transmit malaria. Here in Java it is very difficult to secure literature on the subject. Professor De Meyers, of Amsterdam, kindly informed me by letter that the 1907 edition of Theobald's "A Monograph of the Culicidae of the World" contains the following on page 3: "*M. Rossii* is said not to be an active distributor in India, while Mr. Green says he is almost sure it is accountable for some of the outbreaks in Ceylon;" and on page 47, "the malarial parasite will develop in it, but it has not yet been found infected naturally. Mr. Green considers it to be the malarial carrier in parts of Ceylon, especially in the Batticaloa district. He found the larvæ breeding in the brackish lake at Batticaloa town, and on the coconut estates he found them breeding in small water holes used for watering the young coconuts, and on some estates in earthenware chatties sunk at the base of the palms."

¹ Read at the first biennial meeting of the Far Eastern Association of Tropical Medicine, held at Manila, March 10, 1910.

² Chief medical officer, Samarang, Java.

³ Cf. Banks, *This Journal*, Sec. B (1907), 2, 513; (1909), 4, 238. (Ed.)

⁴ A Handbook of the Gnats or Mosquitoes. London, 2d ed. (1902), 311.

⁵ A Monograph of the Culicidae of the World. London, 2d ed. (1901), 85.

⁶ *Ztschr. f. Hyg. u. Infectious-krankh.* (1902), 41, 15.

⁷ *Second Rep. Wellcome Res. Lab., Khartoum* (1906), 27.

⁸ *Manuel pour la lutte contre les Moustiques.* (1906).

Manson⁹ includes *Myzomyia rossii* in a list of anophelines "which have been shown with more or less precision to be efficient hosts of the malarial parasites." It is noteworthy that in the same edition Theobald, and also Giles and Dönitz, mention the names of Daniels, Ross, Christopher, and Stephens as having in vain attempted to show the capability of infection of *Myzomyia rossii*; and neither Theobald nor Manson gives the names of those who have been able to do so. Theobald only refers to the opinion of Mr. E. Green,¹⁰ government entomologist at Ceylon, as to the part played by *Myzomyia rossii* in the epidemics of malaria which break out from time to time in the Batticaloa district of Ceylon. This seems to imply that he infers the infectibility from epidemiological data, and not from successful experiments. From this article it appears that Mr. Green has not made any experiments in transmitting the infection.

I have never found an infected specimen among the large numbers of individuals of *Myzomyia rossii* which I have caught and examined in my own house at Samarang.

Other Anophelinae have been met with further inland, but never near the shore. Mosquito larvæ floating horizontally on the surface of the water have been collected in various degrees of contamination, and the mosquitoes developed from these larvæ resembled each other in all particulars.

In my publication "Anophelines dans l'eau de mer,"¹¹ I called this species "*Anopheles vagus*" from the description given by Dönitz.¹² Specimens obtained from larvæ bred in sea water and partially evaporated sea water were examined by Professor De Mevero, of Amsterdam, and he declared them all to be *Myzomyia rossii*. Indeed, Blanchard, among other authorities, also considers *Anopheles vagus* not to be a new species discovered by Dönitz, but as identical with *Myzomyia rossii*.

The absence of any other species which might presumably be a transmitter of malaria led to the question whether the reason why infection experiments with *Myzomyia rossii* had yielded negative results might not be found in the fact that up to the present time they had always been made with specimens bred in fresh water. Until quite recently it was not known that *Myzomyia rossii* is able to develop in water containing a high percentage of salt; the *M. rossii* caught in my house, which, as above stated, I had examined with negative results, were also derived from fresh water. This species, so frequently encountered near the seacoast, generally breeds in water containing a comparatively high percentage of sodium chloride. In connection with the prevalence of malaria near the coast, this fact leads to the supposition that possibly this high percentage of salt in the breeding places may offer a favorable condition for the

⁹ Tropical Diseases. New York, 4th ed. (1907), 147.

¹⁰ Trop. Agr. (1909), 32, 84. Kindly sent me for reference by Dr. W. T. Hunger, of Salatiga.

¹¹ Atti Soc. mal. (1907), 2, 1-27.

¹² Ztschr. f. Hyg. u. Infektionskrankh. (1902), 41, 80.

transference of the gametes to the stomach of the mosquito and the further development of the parasites, i. e., it may render the mosquito more liable to malarial infection.

Considered in this connection, the statement of Schoo, namely, that in the polders of North Holland malaria formerly raged more violently in those places where the water was brackish, acquires a special significance. At Samarang, it appears from the morbidity tables collected by Doctor Terburgh that the number of children with an enlarged spleen varies between 60 and 100 per cent in the native villages (*kampongs*) situated along the coast and the two overflow canals which carry brackish water far inland and which contain innumerable pools along their banks. Among the rice fields and fresh-water marshes farther in the interior, the numbers vary between 5 and 25 per cent. In the quarters of the town of Samarang situated farther from the coast, I have thus far found only two anopheline species, chiefly *Myzomyia rossii*, and much more rarely *Myzorrhynchus barbirostris* v. d. Wulp. (specimens determined by Theobald).

The larvæ which I have encountered in the rice fields near Samarang before and after the growing of the crops, as well as in fresh-water ponds and marshes, invariably developed into imagines, which, as far as I could observe, in every detail resembled specimens of *Myzomyia rossii* found along the coast. I have never found *Myzorrhynchus barbirostris* in the larval state, but always as an imago, and then very rarely. Although other anopheline species may occur at Samarang, it is certain that *Myzomyia rossii* far exceeds them in number, and forms the most important subject for malarial epidemiology here. Green¹³ mentions that *Myzomyia rossii* also is the species occurring in the Batticaloa district. It is a remarkable fact in connection with the malaria epidemics which he mentions, that, in this district also, the breeding places were found along a lake containing brackish water. No other anopheline species found in our Archipelago is known to adapt itself so readily to the saline condition of the water in which the ova are deposited, as *Myzomyia rossii*.¹⁴

¹³ Loc. cit.

¹⁴ I find it stated in the *Rev. of Some of the Recent Advances in Trop. Med.*, supplement of the *Third Rep. Wellcome Research Lab. at the Gordon Memorial College, Khartoum*, page 134, that in 1908 F. H. Foly and A. Yvernault published a paper entitled "Anophelines dans l'eau salée" in the *Bull. Soc. Path. Exot.* (1908), 1, 172, in which they say that in Algiers breeding places of the anopheline species *Pyreophorus chaudierei* Theob. were found containing a high percentage of salt; and in the *Ann. Soc. nat.* (1906), 7, that in Algiers, larvæ of *Anopheles maculipennis*, which occurs exclusively along the shore of the Mediterranean, were found in water containing 0.481 per cent of sodium chloride. It is also stated by Schoo that Nuttal, Celli, Ficalbi, Grassi, Centanni, Christopher and Stephens found larvæ in water containing 0.656 per cent sodium chloride, Perrone in 1.87 per cent, and Vivanti in 1.74 per cent sodium chloride.

No other species is known to be capable of developing both in fresh water and in partially evaporated sea water containing more than 5 per cent sodium chloride. This species, *M. rossii*, therefore, is especially suitable for determining the limits within which the quantity of salt contained in the breeding places may or may not render the mosquitoes produced in them more or less liable to infection with malarial plasmodia.

Suitable subjects for making infection experiments on mosquitoes are rarely encountered among the sufferers from malaria in the Samarang hospitals. Gametes are generally found only sporadically in the peripheral blood. Consequently, on October 25, 1908, when a female patient, whose blood-smears under the microscope showed two or three Laveran crescents in every field, applied for admission to one of the hospitals, the opportunity was eagerly seized.

The patient was a young native (Javanese) woman from the Karang Bidara quarter situated within the district of malarial centers along the coast. She was extremely anemic, and had a spleen that reached to the umbilicus. The pulse was regular. The temperature varied between 36° and 36.8°. Apprehending the ever-threatening pernicious attack, it was decided to give a dose of 0.500 gram of hydrochloride of quinine three times a day. This dose was administered daily from October 26 onward.

Meanwhile, mosquito larvae were obtained along the coast from pools containing water of varying concentration, from rain water, up to solutions containing 1.6 per cent sodium chloride. After a few difficulties had been overcome, the first mosquito was dissected with a positive result. This was on November 3, and after the patient had taken 1.5 gram of quinine for nine days. The insect had sucked the patient's blood five hours previously.

The stomach, full of blood, was crushed under a cover-glass. When examined under the microscope, worm-like, moving organisms which resembled ookinetes were visible. The preparation was then stained according to Giemsa's method. Many spool-shaped elements were then seen, with an intensively colored chromatin core in the middle and the pigment compressed to one point in the spool. The picture exactly resembled the illustrations of ookinetes in colored preparations given by Schaudinn. Unfortunately, it is not known what percentage of common salt was contained in the water from which this mosquito was produced. The following table gives the results of these experiments, together with a few of the more important details:

chloride and also from fresh water, sucked the blood later than those from water with 1.3 per cent.

A gradual decrease was observed in the number of gametes in the peripheral blood during the time the patient was in the hospital, and this was strikingly apparent during the last days of her stay. During the first days, gametes were found in every field, and in the fresh blood the microgametes were seen repeatedly, swarming out of the microgametocytes. When the patient left on November 13, only a few crescents were discovered in the preparation after considerable search. On examining the fresh blood in the last days, many phagocytes were seen actively employed in absorbing the crescents, a clear proof of the way in which the human organism rids itself of this infection.

The diminished chances of infection when a much smaller number of gametes are present than there were originally, is an important factor, which must certainly not be neglected in considering the negative results of the last days of the experiment, when, as it happened, mosquitoes from water with a low or hardly any percentage of salt were tested.

Although, of course this inquiry in no way lays claim to completeness, yet where the chances of carrying out the experiments are so rare it seemed to me not out of place to publish the result, as at least it has been shown experimentally that *Myzomyia rossii* can be infected with *Plasmodium immaculatum*. This fact alone seems to me of no little importance, as, among other things, it clearly shows the way in which malaria may spread along the coast in our Indian islands. In order to be certain that the mosquitoes which I used in these experiments really were *M. rossii*, I sent the specimens of the same breed which we had kept for determination, to Professor Nuttall, of Cambridge, with the request that they might also be submitted to Theobald. I take this opportunity of expressing my sincere thanks to Professor Nuttall for the way in which, with his usual obliging kindness, he complied with my request.

All the specimens obtained from larvæ collected on six different dates from six different breeding places proved to be *Myzomyia rossii*. What remained of the mosquitoes 2, 3 and 5, after dissection, namely, the wings, legs, head with thorax and abdomen, was also sent in three separate tubes filled with alcohol and marked 2, 4 and 5. I was informed that Theobald said he was unable to effect a determination from the fragments sent to him. The chance that just these specimens should happen to belong to another species is too slight to be considered.

Although these experiments, made with the purpose of infecting *Myzomyia rossii* taken from water containing 1.3 per cent sodium chloride, may not in themselves lead to any definite conclusion, as to the positive influence of the salt contained in the breeding places upon the liability to malarial infection of *Myzomyia rossii* developed in such a solution, nevertheless the hypothesis that such an influence exists is supported by

the probability that earlier experiments were unsuccessful because they were made with insects taken from fresh water. It may be presumed with some certainty that the liability to malarial infection is variable in the same anopheline species. We are quite in the dark when we attempt to point out the causes influencing this liability. Without any known reason we sometimes succeed, time after time, in our infection experiments, and then again, under apparently similar conditions, we are entirely unsuccessful.

There are districts where formerly malaria was extremely prevalent but where now the disease is rarely encountered (as in Tuscany), notwithstanding the fact that there is no decrease in the number of anophelines, and malarial subjects are imported into these regions from other parts, a fact which would lead one to expect an increase of malaria. Where no immunity has set in among the inhabitants, the causes of this phenomenon must be sought in a state of immunity in the prevailing anopheline species, arising from outward circumstances which did not exist before. A knowledge of the causes of such immunity might be a powerful weapon in combating malaria in epidemic form.

The results obtained from these few experiments seem to me to point a way which offers a chance of determining one of these causes with certainty. Finally, they confirm what has been shown by the experiments of Gualdi and Martirano and of Schaudinn, namely, that the gametes from blood containing quinine develop to oöcysts in the stomach of the anopheles mosquito.

ANTIMALARIAL PROPHYLACTIC MEASURES AND THEIR
RESULTS AT THE NAVAL STATION,
OLONGAPO, P. I.¹

By A. W. DUNBAR.²

While the naval station proper at Olongapo has an enviable sanitary reputation, there has always been a large number of cases of malarial infection attributed to other places on Subig Bay, especially to the Marine target range at Maquinaya, distant about 4 miles. The exact reason why malaria should be comparatively rare at the station itself is not evident, as the presence of the anopheles mosquito and a large native contingent furnish the factors necessary to infect the force of approximately 1,000 men. The elevation of the quarters to a height of about 5 feet and the absence of vegetation probably have much to do with it.

In January, 1909, the hospital ship *Relief* was ordered to Olongapo to care for the large number of sick which overtaxed the small sick quarters. Incidentally, the utility of a hospital ship, even in the time of peace, was shown in this instance, as it furnished a mobile hospital which could be used to supplement those on shore in cases of unusual concentration of force, or in the event of an epidemic or serious catastrophe.

I will not burden this paper with the figures showing the amount of malaria then present at the station, but it suffices to say that about one man in ten was practically unfit for active service in the field. The seriousness of this can better be appreciated when it is understood that the two regiments of the Marine Corps at this station constitute the personnel of the advanced base and expeditionary force in case of hostilities in this part of the world.

By reviewing the medical records of the station and constructing a chart showing the admission for each month, the greatest increase of malaria was graphically shown to follow the opening of the target season at Maquinaya, other duties, such as practice marches, and the presence of a company at Mecmany Point erecting a battery, causing slight rises; while during the rainy season, when the Marines were more or less re-

¹ Read at the first biennial meeting of the Far Eastern Association of Tropical Medicine, held at Manila, March 10, 1910.

² Surgeon, United States Navy.

stricted to the barracks or station, there were but very few cases, and these were probably unreported infections continuing from past months. On the chart accompanying this paper, the admissions have not been reduced to percentages as the strength of the command was found to have been so nearly constant as to make its calculation unnecessary.

At this time, abandonment of the range upon which there had already been considerable expenditure of money and labor, was seriously considered.

The Maquinaya range is located on a narrow sand spit between the sea beach and an impassable morass, into which flows a stream of considerable size which overflows much of the range during the rainy season. While considerable clearing of the range had already been done, there were both high grass and mangrove trees close to the camp, and anopheles mosquitoes were present in considerable numbers, especially in the evening when the breeze failed. The men were quartered in tents and slept on the regulation folding camp cot under nets. The protection from mosquito bites afforded by these narrow nets is more in theory than in practice, for a slight movement of the body or limbs during sleep results in contact with the net, permitting the mosquito to feed to its satisfaction without fear of molestation.

A board appointed for the purpose recommended (1) filling in of the swampy land on the range and further clearing of the ground so that there should be no shelter for the mosquito within at least 200 yards of the range; (2) the erection of thoroughly screened quarters for officers and men. These recommendations were carried out and the quarters completed by the date of the opening of the target season. The buildings are of light construction, elevated about 4 feet from the ground, well ventilated and completely screened.

RESULTS.

During the first quarter of last year there were 105 admissions to the hospital ship, giving 2,214 sick days, and the station sick quarters were constantly kept filled, and this has been the yearly experience since the range was established. During the elapsed part, over one-half, of the first quarter of this year, there had been 8 admissions to the hospital ship for malaria, giving 120 sick days, and there have been only 53 cases treated at the sick quarters.

Before concluding, a few words may be added regarding treatment. To you, accustomed to a tropical medical practice, this is not pertinent, but to the newcomer, acquainted with the mild infections of the Temperate Zone, yielding readily to quinine in 1 to 2 gram doses, the administration of 4 to 8 grams daily seems heroic, but thus has been found necessary here. The treatment is, as a rule, continued for three weeks, but not necessarily or usually in the larger doses. The worst cases we have had, being in a state of collapse requiring saline intravenously, were those who had repeated returns under the smaller doses.

ILLUSTRATION.

Chart showing admissions for malaria by months.

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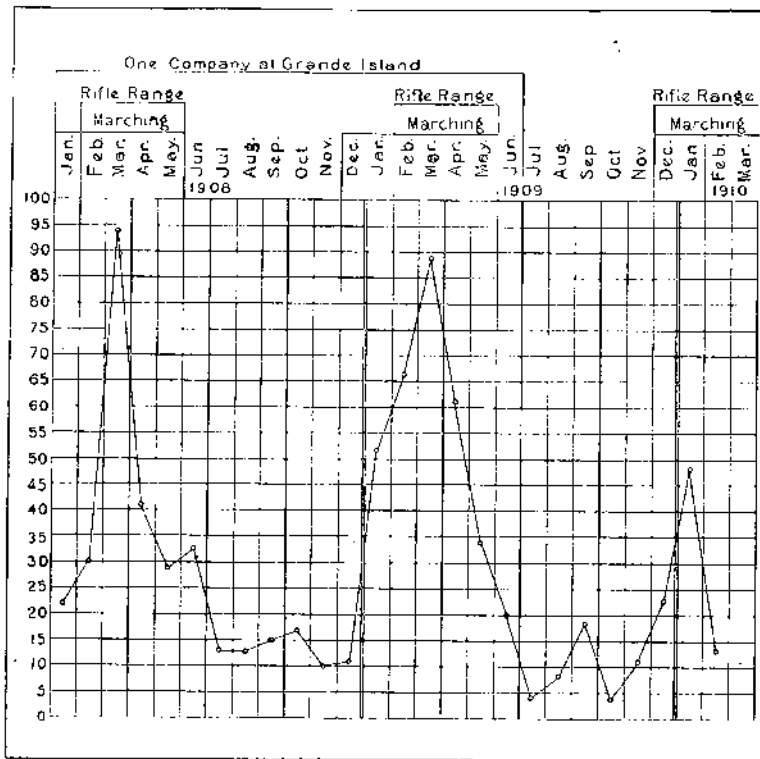


CHART SHOWING ADMISSIONS TO MALARIA BY MONTHS.

THE INCIDENCE AND COMPLICATIONS OF MALARIA IN THE PHILIPPINE ISLANDS WITH SPECIAL REFERENCE TO ITS TREATMENT WITH ARSENOPHENYLGLYCIN.¹

By FRED B. BOWMAN.

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Between the years 1904 and 1908 approximately 36,700 deaths occurred in Manila. Of these, 762, or about 3 per cent, were reported to be due to malaria. Ten per cent of the deaths from malaria occurred between the ages of 1 and 5 years. The percentage is very low between 5 and 15 years; but from 15 to 30 we find recorded 50 per cent of the total number. After the age of 30 the percentage rapidly drops until 50 is reached, after which the mortality from malaria is but 1 per cent.

About 12,000 deaths are reported annually in the Philippine Islands as due to malaria, 5 per cent of the total mortality. The following statistics were obtained from a study of the histories of 100 consecutive cases admitted to St. Paul's Hospital.

Tertian malaria was found to be most common, 43 per cent of the total number of cases being infected with this parasite. *Æstivo-autumnal* was more frequent than quartan fever, the former constituting 37 per cent and the latter but 13 per cent of the cases.

Approximately 50 per cent of the cases had an enlarged spleen, the type of malaria seeming to influence the extent of splenic enlargement little, if at all. Two cases were sometimes seen side by side in the same ward with practically identical histories, symptoms and blood pictures; one with a spleen reaching to the umbilicus, the other with that organ not palpable.

The average red blood cell count in these cases was 3,000,000, although in a few malignant and cachectic cases it was much lower. Infection with intestinal parasites, occurring as it does in so many of the natives, to a great extent influences the blood picture, usually making differential counts of little value.

Black water fever is rare in the Philippine Islands. I have never seen a case here. Malarial dysentery is of quite common occurrence. Malaria in itself rarely is a fatal disease in these Islands, but after two years' work in the free dispensary and the wards of St. Paul's Hospital, the fact is impressed on me more and more that many of the

¹ Read at the first biennial meeting of the Far Eastern Association of Tropical Medicine, held at Manila, March 10, 1910.

neuroses and indefinite conditions which we meet with are due to latent malaria, or to succeeding attacks lasting over periods of years.

The usual complications of malaria will not be dealt with in this paper, but some of the most common conditions complained of by the natives will briefly be described. The etiology of most of these appears obscure, but it may possibly in the future be cleared up in some measure by a closer questioning of the patients as to the previous diseases from which they have suffered and particularly with reference to the occurrence of "chills and fever."

A great many patients enter the free dispensary complaining of loss of sensation in the extremities which they describe as "heaviness" of the feet and legs. A large proportion of these patients are extremely anemic. The conjunctival and mucous membranes are pale, the patellar reflexes absent, and there is some loss of sensation in the extremities. Others present the typical symptoms of a peripheral neuritis. On questioning these patients carefully, a large percentage give a distinct history of recurring attacks, of chills and fever for which the Filipino has a special name, "*bigiki*." Too many of these cases are diagnosed as beriberi, and a great many of these diagnoses would probably be changed if the previous history of the patient were taken more thoroughly.

Nephritis among Filipinos from 15 to 30 years of age is also extremely common, and it is not unusual to see in young men perhaps five cases of chronic nephritis in a ward of twenty-five beds; not favorable cases, but those exhibiting anasarca, œdema, shortness of breath, high blood pressure and all the signs of severe kidney trouble. The etiology of a number of these cases of nephritis always has been obscure, and the great proportion of sufferers from malaria encountered, some with serious and others with moderately severe symptoms in which the urine contains albumin and casts, leads the clinician to think of the possibility that malaria is the original cause of the kidney affection.

Nearly all cases of malaria during and after the pyrexial period have larger or smaller amounts of albumin in the urine. One attack probably causes no permanent symptoms of nephritis, but repeated ones, covering periods of years, undoubtedly have a deleterious effect on the normal action of the kidneys and lead to a definite chronic nephritis; therefore, malaria should not be overlooked in studying the etiology of chronic nephritis in young adults in countries where malaria is endemic.

Many other conditions are, of course, met with in studying malaria, which from an etiologic standpoint are very indefinite, but these two complaints which I have outlined are so often recounted by the native patients, so many of whom give very indefinite histories of previous attacks of malaria, that they have been particularly discussed.

THE TREATMENT OF MALARIA WITH ARSENOPHENYLGLYCIN.

While the treatment of malaria is already on a very satisfactory basis, nevertheless, as previous experiments in the treatment of this disease with atoxyl have been reported, and as arsenophenylglycin, employed in the Biological laboratory of the Bureau of Science was giving such excellent results in the treatment of trypanosomiasis, it was decided to try the effect of this drug on malaria. Acting on the advice which was

received, the drug was administered throughout in doses of 0.6 of a gram subcutaneously, a total of two or three doses being given on alternate days. The arsenophenyglycin was dissolved in 10 cubic centimeters of sterile water and immediately injected subcutaneously into the muscle of the abdominal wall or under the skin.²

Ten cases of malaria were treated, six of the æstivo-autumnal type, three of tertian, and one of the quartan form. The following brief excerpts are taken from the histories of the cases.

Case I.—Æstivo-autumnal malaria. Filipino man. Entered the hospital March 26, 1909. Present illness began eight months ago with pain in the legs and epigastrium. Fever occurred every other day at different periods during this time. The patient is extremely anæmic, somewhat emaciated; conjunctival and mucous membranes are extremely pale. The spleen is enlarged 3 centimeters below the costal margin and is sharp-edged and appears rather firm on palpation.

March 29: Crescents, flagellated bodies, and young forms seen in fresh blood-smear. Seventeen crescents found in counting 200 leucocytes. Urine contains albumin, but no casts. March 30: Blood-smear as before; 0.6 gram of arsenophenyglycin was dissolved in 10 cubic centimeters sterile water and injected subcutaneously into the abdominal wall. April 1: Two days later, the blood picture had not changed. Six-tenths of a gram of arsenophenyglycin given as before. April 2: Eight crescents in 200 white blood cells counted and very few young forms seen. April 3: One gram of arsenophenyglycin injected. No young forms. April 7: Numerous crescents and ovoids seen in the fresh blood-smear. April 8: An erythematous rash appeared on different parts of the body surface. April 9: The patient complains of severe pain in the stomach and cramps in the abdomen. April 12: Extreme pain in the extremities. Absence of knee jerks. The typical "steppage" gait of peripheral neuritis was evident, and later in the day severe spastic contractions of leg muscles. The administration of purgatives (calomel and magnesium sulphate) caused these symptoms to subside in a few days.

Three differential blood counts were made at different times with the following result: April 2: Polymorphonuclears, 50.1 per cent; large mononuclears, 25.6 per cent; small mononuclears, 4.7 per cent; eosinophiles, 17.5 per cent; mast cells, 0.4 per cent; transitionals, 1.4 per cent. April 5: Eosinophiles had increased to 17.5 per cent. March 29: Polymorphonuclears, 65 per cent; large mononuclears, 23 per cent; small mononuclears, 6 per cent; eosinophiles, 4 per cent; mast cells, 1 per cent; transitionals, 1 per cent. Crescent bodies could always be found in blood-smears until the patient was discharged.

Case II.—Æstivo-autumnal malaria. Filipino man. Complaint: Fever. Entered the hospital May 11. Previous illness: One year ago for two weeks he had the same trouble, with severe chills and diarrhœa. The present illness began three weeks ago with chills and fever, and severe diarrhœa.

May 11: Blood examination shows blood cells to be rather pale. Numerous crescents and a few half-grown æstivo-autumnal parasites.

May 16: Red blood cells, 5,000,000. Differential count, polymorphonuclears, 40 per cent; large mononuclears, 50 per cent; small mononuclears, 3 per cent; eosinophiles, 2 per cent; mast cells, 1 per cent; transitionals, 2 per cent.

An examination of the urine showed the presence of albumin. No casts.

May 17: Six-tenths of a gram of arsenophenyglycin given. May 18: Urine

² Arsenophenyglycin is rapidly oxidized in the air, the resulting product being intensely toxic.

shows large quantity of albumin. May 19: Six-tenths of a gram of arsenophenylglycin given. Eosinophiles had increased to 5 per cent. May 24: Numerous crescents found and no young forms. After the last injection May 19 the temperature remained low until the patient left the hospital, but parasites were always present.

Case III.—Tertian malaria. Filipino man. Complaint: Chills and fever for a month at first every third day, but now every day. Headache severe, and occasionally the patient says he becomes dizzy and loses consciousness. He appears extremely pale and anæmic. A hæmic murmur is heard at the base of the heart. The spleen is not enlarged and otherwise the general physical examination is negative. A blood-smear shows numerous half-grown tertian parasites.

May 26: A blood-smear is the same as above. Six-tenths of a gram of arsenophenylglycin given. May 27: No change in blood picture. May 28: Six-tenths of a gram of arsenophenylglycin given. May 30: A few half-grown forms. June 7: Severe local reaction at the site of the last injection. Later, an abscess developed which proved to be sterile.

Case IV.—Æstivo-autumnal malaria. Filipino man. Complaint: Chills and fever. Present illness has continued for three months with chills and fever two or three times a week and pains in the legs, bones and joints. The patient is very pale and weak. A soft and blowing murmur is heard at the point of maximum impulse. The spleen is enlarged 1 centimeter below the costal border.

May 27: A blood-smear shows young amoeboid forms and also nearly full-grown æstivo-autumnal parasites. No crescents seen. May 28: Six-tenths of a gram of arsenophenylglycin given. May 29: No changes in the blood picture. May 30: A few crescents found and very few young forms. Six-tenths of a gram of arsenophenylglycin given. June 12: A blood-smear shows numerous crescents, no young forms. The patient has gained in weight and feels perfectly well. When he entered the hospital much albumin was found in the urine. At the time of discharge no albumin was present.

Case V.—Æstivo-autumnal malaria. Filipino man. Complaint: Chills and fever. Typical symptoms of malaria. The spleen is enlarged 10 centimeters below the costal margin; it is movable and soft.

May 20: Young intracorporeal forms and crescents present in a blood-smear. May 26: Crescents and young amoeboid forms. Six-tenths of a gram of arsenophenylglycin given, the patient's temperature being 40° at the time of injection. The temperature dropped, but rose again on June 1, when 1 cubic centimeter of a solution of hydrochloride of quinine was given and then 0.62 gram three times a day until the patient was discharged on June 16, on which date a blood-smear showed a few crescents but no other forms of the parasite.

Case VI.—Tertian malaria. Filipino man. Complaint: Chills and dysentery. The patient is extremely pale, tongue coated and breath foul. A general physical examination shows nothing of importance except an enlarged liver, 3 centimeters below the costal border. The spleen is not enlarged.

May 28: Numerous tertian parasites found in the blood. May 30: Parasites found in a blood-smear. June 2: Six-tenths of a gram of arsenophenylglycin given. June 7: Marked local reaction at the site of injection. A blood-smear was negative. June 10: The abscess opened and drained. No organisms were seen in a stained smear and no odor is present. June 19: Blood examined after a slight rise in temperature, and parasites found.

Case VII.—Subtertian (malignant) malaria. Filipino man. The patient is in a semiconscious condition and will not answer questions. He is extremely anæmic; the liver is not enlarged and the spleen is not palpable. A blood-smear

showed red blood cells very pale and vacuolated with poikilocytosis and anisocytosis. Numerous hyaline amœboid forms seen in the cells, sometimes two in one red blood cell. Red blood cell count, 2,500,000.

May 31: Six-tenths of a gram of arsenophenylglycin given. June 1: Hyaline bodies numerous. June 2: Hyaline bodies numerous and 0.6 gram of arsenophenylglycin given. June 3: A few hyaline bodies seen. June 5: The patient was in a semicomatose condition and a hypodermic injection of 1 cubic centimeter hydrochloride of quinine was given, when the temperature fell and the patient rapidly improved under quinine sulphate. After the injection the patient developed two severe abscesses which were sterile.

Case VIII.—Quartan malaria. Filipino woman. Complaint: Pain in the legs and abdomen. Previous illness: Ten years ago the patient had chills and fever, and was treated with quinine. Present illness: This began six months ago and the patient now complains of severe pains and tenderness in the muscles of the calves of the legs. The spleen is enlarged to 1 centimeter below the costal margin. Knee jerks are absent. A blood-smear shows numerous quartan parasites.

June 7: Six-tenths of a gram of arsenophenylglycin given. June 8: Parasites present. June 9: Half-grown and nearly mature parasites present. Severe tenderness over the sites of the injection. Six-tenths of a gram of arsenophenylglycin given. June 11: Sterile abscesses present, which on being drained quickly healed.

Case IX.—Æstivo-autumnal malaria. Filipino man. The patient is almost in a comatose condition and answers questions very unsatisfactorily. The spleen is enlarged to 2.5 centimeters below the costal margin. Numerous young forms as well as crescents were present in the blood.

June 7: Crescents numerous. Many ovoids present. Six-tenths of a gram of arsenophenylglycin injected. June 8: Tenderness over the area of injection. Crescents present. June 9: Six-tenths of a gram of arsenophenylglycin given. The temperature at the time of injection was 40° C. June 12: An abscess at the site of inoculation. Quinine, 1 gram, given hypodermically as the temperature is rising and the blood shows numerous parasites. June 16: The abscess evacuated, the pus proving to be sterile.

When the patient was discharged crescents could still be found in a blood-smear, although no young forms were seen.

Case X.—Tertian malaria. Filipino man. Present illness: Began three months ago with chills and fever. The history and examination show nothing of importance except an enlarged spleen 3 centimeters below the costal border. A blood-smear shows numerous adult tertian parasites.

June 16: Six-tenths of a gram of arsenophenylglycin given. The patient had no fever at the time of injection, which was given not on the day of the usual paroxysm. June 17: The patient had a paroxysm as usual. June 18: No temperature. Six-tenths of a gram of arsenophenylglycin given. Later in the day the patient had chills and high fever. June 19: The temperature did not return to normal. June 20: The temperature again rose. June 21: One cubic centimeter of hydrochloride of quinine given and the temperature returned to normal and remained so until the time of patient's discharge from the hospital.

All the cases treated complained of severe pain at the time of injection.

Case I, diagnosed as *æstivo-autumnal fever*, received altogether 2.2 grams of arsenophenylglycin and in five days developed symptoms of arsenical poisoning.

In some cases of arctivo-autumnal infection the young forms of the parasites seemed to disappear after injection of the drug, but in all instances the crescents were not affected.

No definite effect was noted in the three cases of tertian malaria, parasites being found in each, at some period after the injections of arsenophenylglycin. No effect was produced in the case of quartan malaria.

Severe abscesses resulted from the injections in five cases. All were sterile, no growth occurring when the pus was transferred to culture media.

The effect of the drug on the kidneys was practically negative. Case II showed some increase in the amount of albumin after treatment. On the other hand, the albuminuria disappeared in Case IV after treatment with arsenophenylglycin.

CONCLUSIONS.

1. Splenomegaly is by no means a constant symptom of malaria.
2. Chronic nephritis is a common sequel of recurring attacks of malarial fever.
3. Peripheral neuritis and many of the cases diagnosed as beriberi may be attributed to frequent previous attacks of malaria.
4. Treatment with arsenophenylglycin produces no definite effect on the life of the malarial parasite, and has seemingly no effect on the crescent body.
5. An overdose of arsenophenylglycin may produce the symptoms of arsenical poisoning.

One case of filariasis was also treated with arsenophenylglycin. The patient's blood was examined at intervals of four hours for twenty-four hours; at 1.30 p. m. no embryos were found in three drops, but at 5 a. m. 50 motile organisms were present.

In all, 3 grams of arsenophenylglycin were given to this patient, who also developed symptoms of arsenical poisoning, with an erythematous rash which later went on to the stage of desquamation.

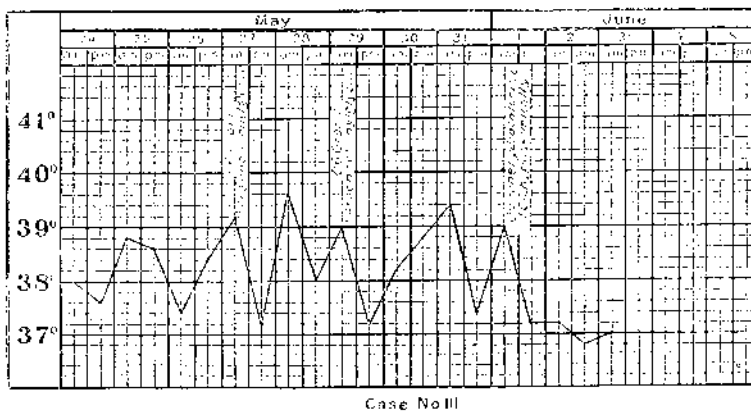
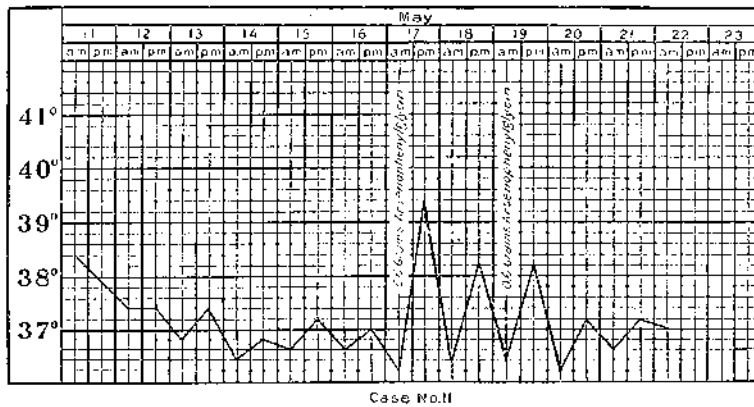
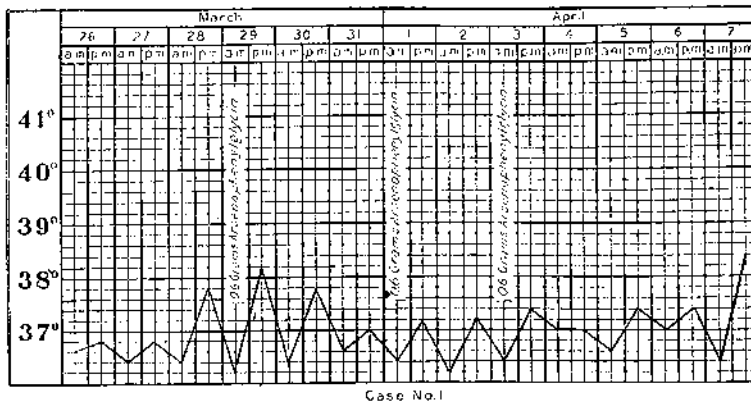
The filarial embryos were unaffected, 65 being counted in three drops of blood after the treatment.

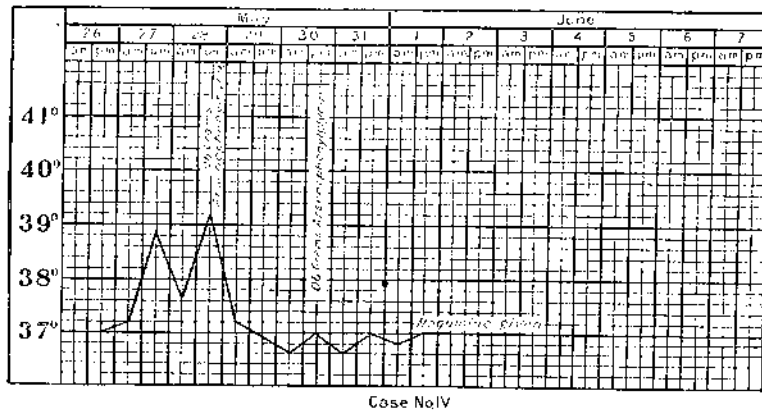
ILLUSTRATIONS.

Charts 1-10.

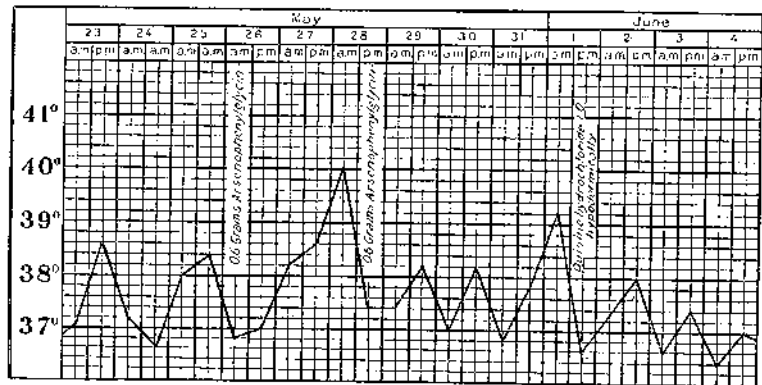
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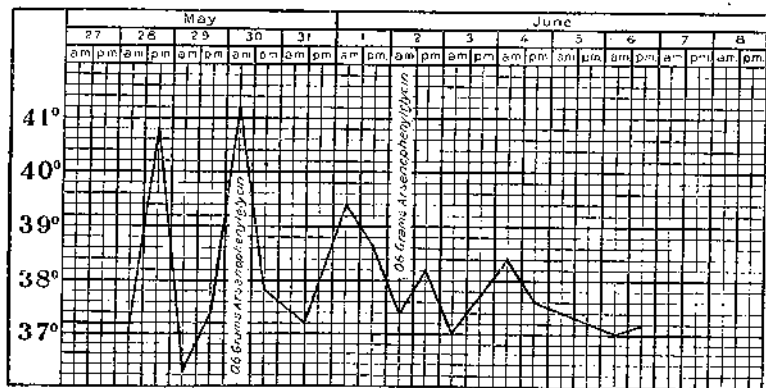




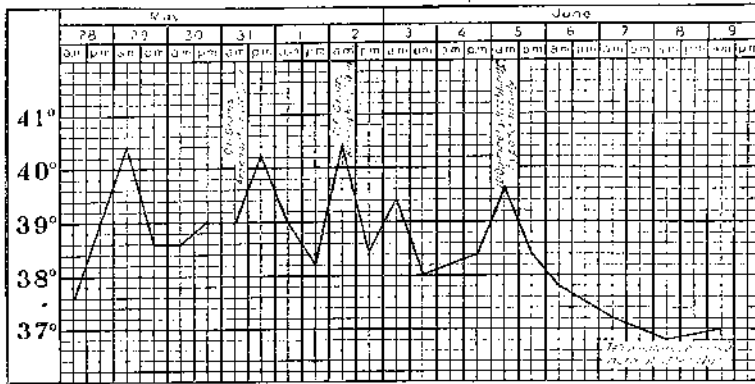
Case No. IV



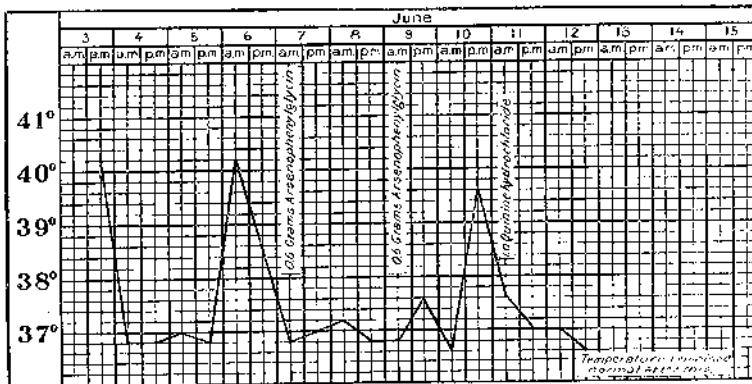
Case No. V.



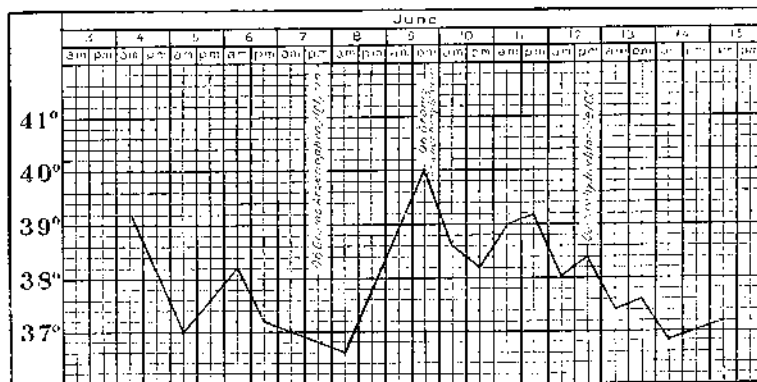
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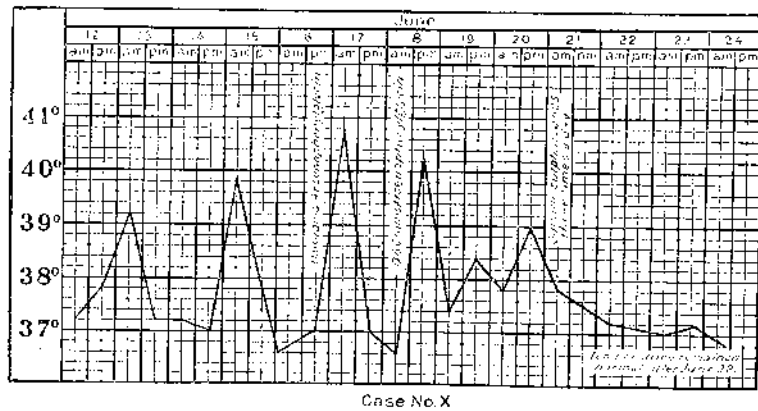
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Case No. VIII



Case No. IX



NOTES ON CONTAGIOUS OPHTHALMIA.¹

By GILBERT E. BROOKE.²

The subject of contagious ophthalmia is one of considerable importance in many parts of the world, for, not only is the factor of contagion high, but the condition is one which often causes much personal discomfort, suffering or disfigurement, and entails much expense and loss to employers of native labor.

During several years' work as port health officer in Singapore, I had been frequently struck with the number of "sore eyes" which were met with among Chinese coolie immigrants, and had noticed the alarming rapidity with which conjunctivitis spreads among the contract coolies confined in depots ashore.

A visit to Hongkong, Amoy, and Swatow, in 1907, still further directed my attention to the subject of trachoma, and on seeing the stringent regulations framed by the United States to prevent the introduction of the disease into their territory I began to wonder what amount of trachoma was prevalent in the East and whether any standard of diagnosis was adapted.

Toward the end of 1908 I examined several sore eyes among incoming coolies who had no trachoma, but smear examinations showed several cases of infection by a Gram-negative organism, one by a diplo-bacillus, and one by a Gram-positive organism.

The subject seemed one of considerable interest, and I therefore had removed to the quarantine station (for diagnosis and treatment) every case of conjunctivitis found on board Chinese coolie ships during the whole of the year 1909, and also made notes of cases occurring among the Malay *lascars* of the marine department.

Some of the cases were examined in my own office laboratory and others by my resident medical officer at the quarantine station. Doctor Raltray, who has kindly put his notes at my disposal.

The immigrants for the year numbered over 240,000 and the Malay

¹ Read at the first biennial meeting of the Far Eastern Association of Tropical Medicine, held at Manila, March 10, 1910.

² Port health officer, Singapore; delegate from the Straits Settlements, Singapore.

staff referred to previously, 100. Out of this material I found 137 cases of conjunctivitis. On examination these proved to be:

1. <i>Catarrhal</i> :	Per cent.
Koch-Weeks bacillus	75
Gram-positive bacillus	20
Morax-Axenfeld bacillus	6
2. <i>Granular</i> :	
Trachoma	7 = 5.1
3. <i>Purulent</i> :	
Gonorrhœal	3
Staphylococcal	1
4. <i>Unclassified, but not trachoma</i>	25
Total	137

The subject of conjunctivitis may be divided into the following headings:

1. *Catarrhal*:
 - (a) Acute.
 - (b) Chronic.
 - (c) Follicular.
2. *Granular*.
3. *Purulent*:
 - (a) Gonorrhœal.
 - (b) Ophthalmia neonatorum.
4. *Membranous*:
 - (a) Croupous.
 - (b) Diphtheritic.
5. *Phlyctenular*.

We need not here concern ourselves with purulent, membranous and phlyctenular conjunctivitis, for the cause and treatment is well known to all; but the catarrhal and granular types are less definite and therefore of greater interest at present.

CATARRHAL CONJUNCTIVITIS.

There are many synonyms for this affection, such as catarrhal ophthalmia, blight, sore eyes, bright eye, etc. The nomenclature is unfortunate, as many cases do not present a condition which coincides with our understanding of what constitutes a catarrh at all, but the term catarrhal conjunctivitis is still preserved in the *acute* form for want of a better one.

Etiology.—As far as work has gone at the present time, we find acute catarrhal ophthalmia to be brought about by at least three different causes: (a) The *Koch-Weeks* bacillus; (b) a Gram-positive organism; and (c) the *Morax-Axenfeld* bacillus. A similar etiology will also be found in the incipient stages of purulent and of granular conjunctivitis.

This latter point is of importance as showing the necessity for isolation of cases of acute conjunctivitis in the work of inspection for trachoma.

(a) *The Koch-Weeks bacillus*.—This bacillus was first found in Egypt by Koch in 1883, when he was examining some sore eyes. The discovery was confirmed by Kartulis of Alexandria. The organism was first cultivated by Weeks in New York in 1890. It is somewhat allied to the influenza bacillus, but differs culturally from it, in that the bacillus of influenza will not usually grow characteristically except in blood media. The Koch-Weeks bacillus grows best on serum-agar, but the growth is quite satisfactory also on nutrient-agar at 37° C. and also on glycerin agar plus ascitic fluid.

The colonies occur as transparent dots which tend to coalesce, but never attain a large size. The bacillus is 1.5 to 2 μ in length and about 0.4 μ in thickness. It forms no spores, is nonmotile and is Gram-positive. Its power of resistance is slight and therefore it seems probable that the dust-borne spread of this disease will not often occur. The contagion probably is transmitted either directly by the hands, or indirectly by means of flies. In Egypt, the common house fly is probably the usual channel of infection. In Singapore I have found a very small brownish-red fly, often in large numbers, on coolie ships. I have sent home for identification specimens of this insect.

That the *Koch-Weeks* bacillus is accountable for much of our Eastern ophthalmia seems probable from the fact that it was encountered in 54.7 per cent of my series of cases.

A second cause of catarrhal ophthalmia is a bacillus of which I can find no reports or descriptions. It somewhat resembles the *Koch-Weeks* organism in appearance, but is slightly larger, varying from 2 to 2.5 μ in length. It is nonmotile and forms no spores. The main point of difference from the *Koch-Weeks* organism is that it is Gram-positive. The only cultures I have tried have been on nutrient agar where growth occurred fairly readily as small, dotted colonies.

Clinically, the effect of the organism much resembles that of the *Koch-Weeks* bacillus, but Doctor Raltray has remarked in several of his cases a somewhat follicular type of conjunctivitis. I hope to undertake further work on this organism, with animal inoculations and on various culture media. That the bacillus is not uncommon may be concluded from the fact that it was found in 11.6 per cent in my eye series.

The third cause of catarrhal ophthalmia is the *Morax-Axenfeld* bacillus.

This was first found by Morax in 1896, and independently by Axenfeld. It is about 1 to 2 μ in length and frequently occurs in pairs. It grows readily in Loeffler's blood serum which is liquefied in characteristic pits in sixteen to twenty-four hours. No growth seems to occur on agar, gelatin or the other common media. It is Gram-positive.

The bacillus has been described from Europe, Africa, North America, and Asia.

Only 4.4 per cent of the infections of my series were due to this bacillus, so that it is probably not particularly common in southern China and Malaya. Clinically, I have found this type of conjunctivitis fairly

generally distributed, as in the case of the infection with the *Koch-Weeks* bacillus, but Doctor Raltray found in his cases two instances of angular conjunctivitis.

The *symptoms* of catarrhal ophthalmia call for little remark, and their severity will vary in many cases. There is intense infection of the conjunctivæ, more or less cedema of the tissues and eyelids, lachrymation and mucopurulent discharge. There is a pricking and burning feeling and photophobia in the worst cases. As a rule, the pain is slight. The lymphoid follicles may, or may not be elevated. Normally, these follicles are found scattered in the subepithelial tissue of the conjunctival reflections, and become widely developed in inflammatory conditions. If they become prominent they are then easily visible to the naked eye, but it is highly important not to mistake them for the large "sago-grain" prominences of granular ophthalmia.

All forms of catarrhal ophthalmia appear to be highly contagious. Both eyes are usually attacked, either simultaneously or within a short time after each other. If untreated, in quite a large number of cases marginal corneal ulcers occur which frequently coalesce and involve considerable areas, and this is a serious Eastern scourge.

Iritis is a less common sequela.

With regard to the *treatment* of catarrhal ophthalmia, there are several points of interest. The condition usually yields to treatment in one to two weeks, although it occasionally tends to become chronic, especially if the treatment has not properly been carried out. The essentials consist in (a) removing the germ by medication; (b) taking care of the cornea; (c) maintaining the patient's health.

When a case is first seen a smear should be taken for diagnosis, as this will make all the difference when choosing the drug for treatment. The cornea should be thoroughly examined and continually watched. If the specific organism proves to be the *Koch-Weeks* bacillus, I have found that silver salts give the best results in treatment. Protargol and argyrol cause less pain than silver nitrate, but their effect is not so good. As a rule I give a few drops of silver nitrate in a strength of 0.438 gram to 100 cubic centimeters of water (2 grains to the ounce). The strength should never be more than 2 per cent, or sloughing of the lids and opacities of the cornea may result. Frequent irrigations with boric acid will also be necessary to free the eyes from discharge. *No bandage should ever be used*, but the eye should be protected by a suitable shade.

A little weak oxide of mercury ointment should be applied to the margins of the lids to prevent their sticking together. If corneal ulcers occur, the treatment should be even more careful and atropine may be given. With corneal necrosis, eserin, 0.438 gram to 100 cubic centimeters of water (2 grains to the ounce) will help to stimulate the tissues. Nourishing food and tonics are indicated.

The treatment for the cases of infection with the Gram-positive organism which has been described should be on the same lines as that for an infection with a *Koch-Weeks* bacillus.

However, if the causal organism prove to be the *Morax-Axenfeld* bacillus, I have found in most of my cases that silver nitrate is worse than useless and only tends to aggravate the inflammatory condition. The treatment which usually gives the best, in fact almost specific results, is sulphate of copper in 0.25 per cent solution. The solution is best applied with a small cotton-wool mop, and the application should be less frequent as the discharge diminishes.

We now come to the subject of *granular conjunctivitis* or *trachoma*, which is sometimes known as Egyptian or military ophthalmia. This disease is of very wide distribution and frequently leads to very serious results. Its contagious character has been proved many times by inoculation experiments and in all such cases the early symptoms resemble those of catarrhal ophthalmia.

As its contagious character is well recognized, it follows almost certainly that the infecting element is a microorganism. At different times for the last fifteen years many bacilli have been described, but the correct solution has not yet been found. Several spirochaetæ have been found on the conjunctival surface, but these occur in other irritative conditions and are probably only saprophytic.

During the last two years Greeff and Prowazek working independently in Germany, and a medical committee of two in Iowa, have discovered in trachomatous cells certain minute bodies now known as "trachoma bodies." It is possible that these may be the specific cause of the disease. They are slightly ovoid and smaller than any known cocci. They have been found in the contents pressed out from the follicles, in desquamated epithelial cells and in the actual tissues. They occur massed together near the cell nucleus, and appear to be encapsulated. The capsule enlarges, causing the rupture of the cell and the discharge of the granules. Whether the organism occurs in the epithelium, in the lymphoid follicles or in the fibro-adenoid layer, the resultant toxic effects are most marked in the adenoid layer of the tarsal conjunctiva and the retrotarsal folds.

The symptoms are usually as follows: There is a preliminary, acute congestion of the conjunctiva. Very soon small, gray spots rather smaller than a pin's head in size appear in the tarsal conjunctiva of the upper lid. These have been called by Von Graefe "primary granulations," but if there is much congestion accompanying the conjunctivitis, they may be obscured. Translucent "sago-grain" granules speedily form in the cul-de-sac and palpebral conjunctiva. The plica semilunaris and caruncle are congested and chemosis may be present. There is intense photophobia and considerable discharge. After a week or two the acute condition passes into a chronic state, which is often highly intractable. The chief sequelæ (and these together are pathognomonic) are (a) corneal ulcera-

tion and pannus leading to opacity; (b) formation of scar tissue, leading to entropion and trichiasis; (c) conjunctival xerosis and shrinking.

Thus it is seen that the disease is highly contagious, very chronic and leads to grave results. It has frequently been said that trachoma is extremely common in the East. My experience with over 2,000,000 coolies, chiefly from ports of southern China, has not supported this belief. My series last year showed a percentage of only 5.1 to be trachoma. In order to check this result, I looked up the records of the general and pauper hospitals in Singapore, for several years, which disclosed the following:

Conjunctivitis.

Date.	Catarrhal and purulent.	Granular.
1903.....	122	Nil.
1904.....	63	Nil.
1905.....	6	Nil.
1906.....	229	2
1907.....	117	*21

* Also a high total of 14 at quarantine station.

These figures seem to support the other results.

The *modes of treatment* are multitudinous.

1. The best results seem to be secured by—

(a) Expressing the follicles with a flat Grady's forceps or the roller forceps of Knapp. This is best done under an anæsthetic.

(b) Painting the ruptured surface with a little bichloride of mercury.

(c) After a day or two the daily application of solid sulphate of copper should be begun and continued until all traces of hypertrophy have vanished.

The various other methods of treatment have been advocated as (2) Galezowski's excision of retrotarsal folds; (3) Kulut's removal of tarsus; (4) Merck's extract of abrin (sequiritol); (5) X rays, introduced by Mayon in 1902; (6) radium, tried by Treacher Collins in 1904.

However, none of these methods has been as successful as the first mentioned. Cases are frequently eventually cured, but seldom in less than several months, often years.

In conclusion, and to summarize the main points brought out by my series of observations:

1. The percentage of infections with the Koch-Weeks bacillus was much higher than is usually supposed to be the case.

2. A Gram-positive organism was not infrequently met with.

3. The first stage of trachoma is an acute catarrhal ophthalmia, the importance of which should not be overlooked.

4. Trachoma would seem to be somewhat more rare in southern China and Malaya than has generally been thought to be the case.

THE PRESENT POSITION OF THE LEPER IN VIEW OF THE RESOLUTIONS PASSED AT THE INTERNATIONAL CON- FERENCE ON LEPROSY AT BERGEN, 1909.¹

By Sir ALLAN PERRY.²

It must be confessed that very little advance in the treatment of leprosy has taken place during the twelve years' interval which has elapsed since the First International Conference of Berlin was held in 1897. All we can say is that the Second International Conference confirms the views as to the cause of leprosy, its contagious nature and the desirability of isolation and segregation; but as to its successful treatment in the way of prevention or cure, this conference has not been able to do anything except to condemn some recent hypotheses which have been circulated widely and accepted by some members of the medical profession.

Therefore, the leper is in the same position in which he was twelve years ago, which is a disappointment when we consider the large amount of research work on this disease that has been carried out during that period in nearly all countries by men of the highest scientific attainments and clinical experience.

The resolutions passed at the Second International Conference are as follows:

I. The Second International Conference on Leprosy confirms in every respect the resolutions adopted by the First International Conference of Berlin, 1897. Leprosy is a disease which is contagious from person to person, whatever may be the method by which this is effected. Every country, in whatever latitude it is situated, is within the range of possible infection by leprosy and may, therefore, usefully undertake measures to protect itself.

II. In view of the success obtained in Germany, Iceland, Norway, and Sweden, it is desirable that other countries with leprosy should proceed to isolate their lepers.

III. It is desirable that lepers should not be permitted to follow certain occupations which are particularly dangerous in respect to the contagion of leprosy. In every country and in all cases the strict isolation of the leprous beggars and vagrants is necessary.

¹ Read at the first biennial meeting of the Far Eastern Association of Tropical Medicine, held at Manila, March 8, 1910.

² Principal civil medical officer, Ceylon.

IV. It is desirable that the healthy children of lepers should be separated from their leprous parents as soon as possible and that these children should remain under observation.

V. An examination should be made from time to time of those who have lived with lepers, by a competent physician.

VI. All theories on the etiology and the mode of propagation of leprosy should be carefully examined to ascertain if they accord with our knowledge of the nature and the biology of the bacillus of leprosy. It is desirable that the question of the transmissibility of leprosy by insects should be elucidated, and that the possibility of the existence of leproid diseases among animals (rats) should receive early study.

VII. The clinical study of leprosy induces the belief that it is not incurable. We do not at present possess a certain remedy. It is desirable, therefore, to continue the search for a specific remedy.

For the purpose of comparison, the following are the resolutions passed at the First International Conference on Leprosy at Berlin, 1897:

I. In all countries in which leprosy occurs in foci, or is widely distributed, isolation is the best means of preventing the spread of the disease.

II. The system of compulsory notification, supervision, and isolation, as carried out in Norway, should be recommended to all nations possessing local self-government and an adequate number of physicians.

III. It must be left to the legally constituted authorities, after consultation with the sanitary authorities, to determine the special regulation which must be adapted to the special social conditions (of each country).

With regard to the resolutions passed at the Second International Conference, the original of No. II read as follows:

"In view of the success obtained in Germany, Iceland, Norway, and Sweden, it is desirable that these countries should isolate lepers, placing them under such conditions of life as can be *voluntarily accepted by them*," but the members of this conference objected to the word "voluntarily" and passed the resolution as it stands in the paragraph numbered II above.

Another great advance was made when Sir Jonathan Hutchinson proposed as an amendment to the resolutions that as the papers and discussions were presented principally in the German and French languages, with which probably many of the members of the conference were not familiar, it would be better to come to no determination, particularly with regard to that distinguished observer's ideas, as to the relation of a decomposed fish diet with the cause of this disease. This amendment was lost by a very large majority, only two members (including the proposer of the amendment) voting for it, which indicates that the fish theory is not generally accepted.

The failure to carry this amendment has cleared the way considerably for further research along new lines.

Perhaps the most important resolutions passed at the Second International Conference were the following: The second resolution, as to

the absolute necessity for *isolation*; the fourth, "that the children of lepers should be separated from their parents as soon as possible and that they should remain under observation;" and the sixth, "All theories on the etiology and propagation of the disease should be carefully examined to ascertain if they accord with our knowledge of the nature and the biology of the bacillus of leprosy. It is desirable that the question of the transmissibility of leprosy by insects be elucidated, and that the possibility of the existence of leproid diseases among animals (rats) should receive early study."

The concluding paragraph of the resolutions that "we do not at present possess a certain cure" for leprosy is melancholy because of the hopes that are raised whenever a fresh treatment is suggested, which hopes thus far always have ended in disappointment. The same result has attended many "cures" vaunted by their authors in the case of other serious and widespread diseases, but it is well to recognize failure as early as possible and from the feeling expressed at this last leprosy conference it is apparent that the treatment by Doctor Dycke's "nastin" is likely to follow Captain Roost's serum into oblivion.

It was my privilege two years ago, to see some of Doctor Heiser's work in the management of leprosy in the Philippine Islands, and after attending the Bergen Conference last year I was impressed by the fact that the Government of the Philippines had anticipated the measures recommended by the members of that conference by some years.

At the conclusion of the Bergen Conference the delegates for Great Britain and her colonies passed further resolutions at an informal meeting which were to be submitted to the English Government as an indication of the lines upon which, in their opinion, the management of leprosy should be conducted. The following are the resolutions referred to and they were unanimously approved by the eight British delegates who attended the conference and are to be taken in conjunction with the official recommendations passed at the conference.

We, the undersigned delegates from the British and certain colonial governments, unanimously approve the resolutions adopted at the Second International Scientific Congress on Leprosy, held at Bergen, August 16 to 19, 1909. At a special meeting held by us on the 20th of August, 1909, we agreed to the following additional resolutions:

I. Leprosy is spread by direct and indirect contagion from persons suffering from the disease. The possibility that indirect contagion may be effected by fleas, lice, the itch parasite, etc., has to be borne in mind. Leprosy is most prevalent under conditions of personal and domestic uncleanness and overcrowding, especially where there is close and protracted association between the leprosy and nonleprosy.

II. Leprosy is not due to the eating of any particular food, such as fish.

III. There is no evidence that leprosy is hereditary; the occurrence of several cases in a single family is due to the contagion.

IV. In leprosy, an interval of years may elapse between infection and the first recognized appearance of disease. It is a disease of long duration, though some of its symptoms may be quiescent for a considerable period and then recur.

V. The danger of infection from leprosy persons is greater when there is discharge from mucous membranes, or from ulcerated surfaces.

VI. Compulsory notification of every case of leprosy should be enforced.

VII. The most important administrative measure is to separate the leprosy persons from the nonleprosy by segregation in settlements or asylums.

VIII. In settlements, home life may be permitted under regulation by the responsible authorities.

IX. The preceding recommendations, if carried out, will provide the most efficient means of mitigating the leper's suffering and of assisting in his recovery, while at the same time they will produce a reduction and ultimate extinction of the disease.

TUBERCULOSIS AMONG FILIPINOS. A STUDY OF ONE THOUSAND CASES OF PHTHISIS.¹

By W. E. MUSGRAVE and A. G. SISON.

(From the Department of Clinical Medicine, Philippine Medical School,
Manila, P. I.)

The present status of the tuberculosis problem in the Philippine Islands may be summed up in one sentence: A remarkably high incidence, unusually favorable conditions for the spread of the disease, and an almost complete absence of organized effort to combat it. It may be stated in general that conditions favorable for the spread of tuberculosis are practically perfect in this Archipelago. Overcrowding in unsanitary houses located too close together in unsanitary places and closed at night is all but universally prevalent. Our records show many instance of from six to ten or more people living and sleeping in a single room with from one to several individuals among them suffering from advanced pulmonary tuberculosis. Children are born and reared under these circumstances and very frequently nursed by their tubercular mothers.

The dormitories of many of the schools contain tubercular patients to a startling degree. We have records of dormitories in which fifteen to twenty students are sleeping in the same room, with two or more of them suffering from fairly advanced phthisis. Even in our public schools, tubercular patients are often found mingling with other pupils in too close contact for the safety of the whole.

The disease is very prevalent among all classes of people whose occupations are such as to keep them in close relationship with healthy persons. In this class may be mentioned street car conductors and motormen, carriage drivers, house servants, cooks and nurses of infants. During the last year we have caused the dismissal of no less than fifteen women suffering from phthisis who were caring for and in some instances sleeping in the same rooms with the children of their employers. The particular dangers from promiscuous coughing and expectoration are unknown to the majority of the patients, and these acts are practiced unrestrictedly at all times and in all places.

Poor food and lack of exercise are very potent predisposing factors to tuberculosis among the poor of these Islands. The influence of food poor in fats and proteins and excessively rich in carbohydrates is shown by the very marked improvement which so often follows the administration to tubercular patients of good food or cod liver oil. The average Filipino of the poorer class has a peculiar manner of breathing with but slight chest motion, and the vast majority not only have no concep-

¹ Read at the first biennial meeting of the Far Eastern Association of Tropical Medicine, held at Manila, March 12, 1910.

tion of how to expand the chest but it is often very difficult to induce individuals to do so under instruction.

The tuberculosis clinic of the Free Dispensary of the Philippine General Hospital is the first clinic specially for tuberculosis to be established in the Philippine Islands.

It has been in operation for nine months, and of the 1,047 people who have applied for treatment, 914 were suffering from phthisis and their records are tabulated in this paper. The system used in the clinic is very similar to that in operation in many countries. At the first visit a careful history is obtained and a complete examination of the patient is made and recorded on a suitable blank form (see figs. 1 and 2).

P. M. S. No. 37.

FREE DISPENSARY OF THE PHILIPPINE GENERAL HOSPITAL.

TUBERCULOSIS CLINIC.

Fiscal year 191...

No., Name Tuberculosis No.

Date 191... Previous Nos.

Complains of

Diagnosis

Complications

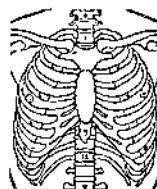
Age male, female, M. S. W. Nativity

Occupation Employed by Wages

Persons dependent on you for support Sent by

FAMILY HISTORY.

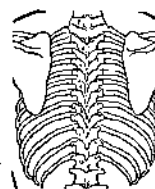
	LIVING (HEALTH)	DEAD (CAUSE)
Father		
Mother		
P. U.		
P. A.		
M. U.		
M. A.		
B.		
S.		
Consort		
Children		



Palpation:
Tactile fremitus
Normal.
Increased
Diminished
Absent.

PHYSICAL EXAMINATION.

Inspection—Thorax—Tenderness—
None.
Rales—dry { none.
 { coarse.
 { fine.
 { none.
Rales moist { none.
 { coarse.
 { fine.
 { none.
Inspection: Chest—normal—nil—
Emphysema—nil—
Expansion—normal—diminished—
absent.



Auscultation:
Normal.
Bronchial vesicular,
Bronchial,
Ampulic,
Cavernous,
Focal,
Absent.

Voiced resonance:
Normal,
Increased,
Diminished,
Absent.

Personal History

Residence when cough began No. and T. B. history of other residents

Present residence No. and T. B. history of other residents

How many sleep in your room? How many of them cough?

Examination:

.....

.....

.....

.....

.....

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.....

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.....

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.....

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.....

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.....

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(OVER)
FIG. 1.

[illegible]

FIG. 2.

Patients are required to report once a week for subsequent observation, and at these visits they are weighed, questioned as to the progress of the disease and occasionally reexamined. When a case is completed by death, recovery, a long period of absence from the clinic, or in any other manner, the record is closed, and as sufficient numbers of such records are completed they are indexed and bound and become a part of the general record system of the hospital.

The records of this clinic, together with certain other statistics which we shall use in the discussion, while not large enough to be conclusive, point to some rather remarkable conditions in our local problem of tuberculosis.

INCIDENCE.

The available statistics indicate a very high prevalence of the disease. Over 20 per cent of all patients applying for treatment at St. Paul's Hospital have phthisis and hundreds of advanced cases of this disease are refused admission to that institution every month. In 100 consecutive autopsies in the Malecon Morgue, Gilman² reported about 40 per cent as having active tubercular lesions, and Andrews, in 500 similar autopsies, encountered about 32 per cent. The 914 cases of phthisis considered here represent 22 per cent of all patients applying at the out-patient department of the Philippine General Hospital during the nine months covered by the record. This record, outlined by city districts, is shown in the following table, which also shows the very general distribution of the patients applying for treatment.

TABLE I.—*Showing residence.*

Districts of the city.	Number at all clinics.	Number at tuberculosis clinic.
Tondo.....	456	106
Binondo.....	372	81
Trozo.....	117	36
Quiapo.....	194	43
Santa Cruz.....	98	130
San Miguel.....	142	25
Sampaloc.....	172	33
Santa Mesa.....	89	18
Santa Ana.....	37	15
Paco.....	354	85
Pandacan.....	61	11
Malate.....	337	59
Ermita.....	129	15
Intramuros.....	647	101
Provinces.....	820	156

The family history (Table II) of the 914 cases shows a prevalence of family tuberculosis which is, so far as we have found, not equaled by any other report in the literature of the subject. The data have been carefully obtained and minimize rather than exaggerate the actual con-

² *This Journal*, Sec. B (1908), 3, 211.

ditions. In particular, the percentage of infection among the children probably is much below the actual condition because of the total mortality of the infants (59 per cent), the majority die during the first year of life and no doubt in many instances before tuberculosis has been contracted or has developed to a degree sufficient for recognition.

TABLE II.—*Showing family history.*^a

Family.	Total number.	Number living.	Number dead.	Number tubercular.	Per cent tubercular.
Father	914	256	258	169	18
Mother	914	327	537	272	29
Paternal uncles	466	165	301	155	33
Paternal aunts	318	98	220	104	32
Maternal uncles	401	126	295	135	33
Maternal aunts	465	155	310	161	34
Brothers	2,094	937	1,157	167	7
Sisters	1,866	914	952	135	7
Consort	601	443	158	104	17
Children	1,920	887	1,023	83	4

^a Family history positive in 88 per cent of all cases.

Our findings as to the infection with tuberculosis in *ascendants* as compared with those of three other authors are shown in the following table:

TABLE III.—*Showing tuberculosis in ascendants.*

	Williams.	Solly.	Osler.	Manila.
Total cases	1,000	250	427	914
	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
Parental	12	28	24	47
Collateral	34	19	35

Contact, other than that naturally encountered in the study of the disease in ascendants and descendants, shows as a strong factor in the etiology. Unfortunately, our early records are not complete in this respect, but from the data which have been secured in a smaller number of cases, actual contact in residence and mostly to the extent of sleeping in the same room with tubercular patients for a greater or lesser length of time, will exceed 70 per cent of all cases.

Age, sex, and social condition are shown in the following table:

TABLE IV.—*Showing age, sex, and social condition.*

Ages by years.	Male.	Female.	Total.	Laborer.	Student.	Upper class.
1 to 10		1	1			
10 to 20	119	51	170	100	68	
21 to 30	185	133	323	289	23	27
31 to 40	109	88	197	194		
41 to 50	70	58	128	124		
51 to 60	43	18	61	58		
61 to 70	25	7	32	30		
71 to 80	2		2	1		
Totals	553	361	914	796	91	27

The small number of children is accounted for by the fact that these patients are cared for in another clinic. The majority of the cases of infection are seen during the second, third, and fourth decades, with a considerable number in the fifth and sixth decades. The ages are somewhat greater than the average found in many clinics, a condition which may be explained by the more generally chronic character of the disease in the Tropics.

The social condition of the patients does not give data of any considerable importance, as the majority of the cases belong to the lower classes, who are very similar in habits and customs.

Occupation is shown in the following table:

TABLE V.—*Showing occupation.*

Occupation.	Male.	Female.
Laborer	372	334
Cigar maker	21	18
Carpenter	24	
Painter	7	
Student	85	6
Government employee	29	
Cook	16	1
Servant	16	2
Totals	573	361

Ninety-one of the patients were students, 29 Government employees, 17 cooks, and 18 servants. The last are particularly interesting, because by vocation they must of necessity for a considerable part of the day be placed in rather close contact with persons whose lives are particularly valuable. During the past year six students of the Philippine Medical School were found to be suffering from phthisis.

Weights, according to ages, are shown in the following tables, but they are not of much value for comparative purposes because there are no similar tables referring to healthy Filipinos which may be used as standards.

TABLE VI.—*Showing weight according to age (male).*

Weight (kilograms).	Age.							
	10-15.	16-20.	21-25.	26-30.	31-40.	41-50.	51-60.	61-70.
22.7 to 27.2		1			1			
27.7 to 31.8	2	2	5		1	2	1	1
32.2 to 36.3		5	11	2	4	3	1	1
36.7 to 40.8		22	9	15	15	14	7	1
41.3 to 45.4	4	59	45	38	32	17	11	6
45.8 to 49.9	1	29	36	21	31	14	7	6
50.4 to 54.5		9	21	7	14	6	6	4
54.9 to 59.0		3	5	5	5	4	3	1
59.4 to 63.6			2	1	1	1		
Over 63.6					2			

TABLE VII.—*Showing weight according to age (female).*

Weight (kilograms).	Age.							
	10-15.	16-20.	21-25.	26-30.	31-40.	41-50.	51-60.	61-70.
22.7 to 27.2			2	1	1		2	
27.7 to 31.8		1	3	3	8	4	4	1
32.2 to 36.3	2	4	8	18	26	20	7	2
36.7 to 40.8	2	14	20	34	21	15	6	1
41.3 to 45.4	2	9	19	14	19	10	3	1
45.8 to 49.9		6	5	3	16	4	4	
50.4 to 54.5		4	1	4	6	2	1	
54.9 to 59.0			1		2			1
59.4 to 63.6		1			1			
Over 63.6			2					

The location of the lesions is shown in the following table, which is self-explanatory.

TABLE VIII.—*Showing location of lesions.*

	Right side.	Left side.	Both.
Apex	393	282	343
Front	299	209	306
Back	256	110	144
Base	20	11	6
Axillary	39	21	5

The stage of the disease is shown in Table IX. In this connection we have used only the simple classification of incipient, moderate, and advanced tuberculosis, because it has seemed to us that time could be better spent than in making a more elaborate classification.

TABLE IX.—*Showing degree of the disease.*

Advanced.	Moderate.	Incipient.	Total.
72	708	134	914

The duration of the disease is outlined in Table X, and the data given are based upon the patient's statements of the beginning of symptoms. For this reason the record is not very accurate, showing, of course, in many instances a much shorter duration than that which actually existed. However, when this table is considered in connection with the ages of the patients and the stage of the disease, at the time of examination it seems that the course of the infection is, as a rule, exceedingly chronic, more so, perhaps, than that encountered in temperate climates.

TABLE X.—*Showing duration of the disease.*

Duration.	Male.	Female.
Less than 1 month	84	54
1 month to 6 months	195	136
6 months to 1 year	109	72
1 year to 2 years	63	53
2 years to 3 years	47	17
3 years to 5 years	24	14
5 years to 10 years	31	15
Total	553	561

The principal subjective symptoms of these cases are outlined in Table XI. The table is self-explanatory.

TABLE XI.—*Showing principal symptoms (914 cases).*

Symptoms.	Number.
Cough	914
Bloody expectorations	469
Hemoptysis	51
Fever	673
Pain, chest	526
Pain, back	267
Sore throat and hoarseness	45
General debility	145
Gastric disturbance	48
Chest oppression	64
Night sweats	680
Palpitation	7
Dyspnea	64
Headache	55
Insomnia	147
Chill	117
Dizziness	16

The principal complications, both tubercular and nontubercular, are shown in Table XII. The most noticeable feature of this table is the small number and variety of tubercular complications present. The unusual preponderance of phthisis over other forms of tuberculosis has been noted before this in a general way in Manila, but so far as we know, this table gives the first actual statistics of this condition.

TABLE XII.—*Showing principal complications (total, 914).*

Complications.	Tubercular.	Nontubercular.
Pleurisy, fibrinous with effusion.....	81	
Laryngitis.....	45	
Pericarditis.....	8	
Lymphadenitis.....	10	
Cystitis.....	5	
Pyelonephritis.....	2	
Scoliosis.....	7	
Kyphosis.....	2	
Asthenia.....	15	
Pyæmia.....	2	
Cardiac symptoms.....		16
Exophthalmia.....		2
Epilepsy.....		1
Constipation.....		15
Gastric symptoms.....		45

If the facts established in this series of cases may be accepted as an index of a general condition among the Filipino people, our local problem of tuberculosis should receive prompt and serious consideration. At first glance the great prevalence of the disease, together with the peculiar social and economic conditions obtaining among the inhabitants, would seem to produce a problem of such magnitude as to preclude the possibility of its solution. However, there is a brighter side to the picture, and it is our opinion that even without financial aid from outside sources, it is possible in Manila to make the greatest showing in antituberculosis work that the world has ever seen. The reason for this assertion is that we do not need to spend millions of dollars in clothing, housing, and otherwise preparing our patients to withstand the rigors of the winters of the temperate climates. Climate is not by any means as important a factor in the prevention and treatment of tuberculosis as it once was thought to be. What we need most is education, more room in which to breathe, and an abundance of good food and exercise. As to education, teachers are here in sufficient numbers; there certainly is an abundance of land to provide more space; exercise is free, but the food may need to be supplied until such time as the people are taught to work for it, the best form of exercise.

We do not require expensive concrete hospitals for the treatment of phthisis in the Tropics. The bamboo hut in which a family in Tondo is

living may be an ideal house. What should be done is to move that house out on the Pasay beach, or anywhere else where there will be ample room, use its doors and windows for firewood, and reduce the occupants to a sensible number.

In a recent paper read before the Manila Medical Society,³ we stated in part as follows:

With our more or less limited funds and the peculiar local conditions modifying our problems, its solution along the usual lines of the employment of sanatoriums and other methods which must take a winter climate into consideration, is neither practical nor advisable. The continuous summer, the abundance of cheap and available real estate and the cheapness of residence construction makes large tenement houses unnecessary. In a city in the United States or Europe real estate is of such great value that reasonable air space for its tuberculous poor may be obtained only at enormous expense, while here there are thousands of hectares of cheap land in and near all cities, the cost of construction of very satisfactory buildings is exceedingly small, and, finally, the art of building houses from bamboo is a common inheritance of the people.

The construction of sanatoriums of the colony type for the control of tuberculosis is not a new idea and has been carried out more or less extensively in Europe and in the United States for some years; but in these countries the expense of construction and of real estate has made it too expensive of application on a large scale in congested centers.

The Philippine Islands seem to be peculiarly well adapted to colonization along very economical lines, and we, therefore, recommend the adoption of the method of the elective colony sanatorium together with the immediate construction of an experimental colony in or near Manila, and hereby submit a tentative set of plans for such a colony which have been prepared for us by Mr. C. A. Barretto, of the Bureau of Public Works.

If, as we believe it will, this colony proves itself successful, the plan is economical enough to allow of its extension throughout the Islands.

In general, we would say that the colony should be built and maintained under the direction of the Government. The expense of construction should be light, the Government furnishing the land, building material (bamboo and nipa), and the tenants constructing their own houses according to plans furnished them; the necessary streets and public buildings, such as hospital, schoolhouses, and residence for officials, being constructed by the Government.

The operation of such a colony need not add additional expense to the budget, for officials of the Bureau of Education, Bureau of Health, and Medical School could care for the respective departments with less effort than is now being expended by them in caring for the same tuberculous people scattered here and there in their homes and in Government clinics.

With an abundance of land lying idle, cheap building material, and a class of patients who are able and willing to build their own homes, the cost of construction of an experimental colony to accommodate 250 persons should be small, and we feel confident that the expense of maintenance would be less than the sum which the Government is now paying for the care of a few of its tubercular citizens. At the International Congress of Tuberculosis which met in Washington this year, Doctor Jacobs made a preliminary report of what he termed a "Farm Colony" established in connection with the Maryland Hospital for Consumptives, in which he stated that the colony was practically self-supporting after one year.

³ *Bull. Manila Med. Soc.* (1910), 1, 6.

This, too, notwithstanding the fact that the authorities pay the patients for their work by furnishing them free board and lodging and in some cases as much as \$12 per month in addition.

The farm or "truck-gardening" idea might well be carried out here in connection with the colony, or the idea might be carried further and the patients encouraged to learn and even taught other suitable occupations, with due regard to their physical condition.

In discussing with various persons interested in the subject, the plan outlined in the paper which has been quoted, the query has been raised as to the possibility of securing a sufficient number of patients who would voluntarily avail themselves of its benefits. With this end in view we have inquired of a large number of those visiting our clinic at St. Paul's Hospital, and in every instance the patients have stated that they would gladly build their houses according to our plans and live according to our rules, provided the land and materials for construction were furnished them. From investigation we feel confident that we can give the names and addresses of enough applicants to fill the experimental colony as planned, after twenty-four hours' notice.

ORGANIZATION.

However, no one method will meet the requirements for a successful antituberculosis campaign in this or any other country. In the language of Sir William Osler: "Tuberculosis is the most universal scourge of the human race." Its problem is a general one which has proved too great for boards of public health in governments controlling subjects with much less tuberculosis and much more money than we can ever hope to have available in these Islands. The first step, and one absolutely essential for a successful local campaign, is the organization along broad lines of a National Antituberculosis Society, similar to those now operating in the majority of civilized countries. The preliminary steps to create such an organization have already been taken. At the request of the Director of Health, the council of the Manila Medical Society has appointed a committee to draw up a tentative plan of organization which is to be submitted to a general citizen's committee who will effect a permanent society. This association has also named a special committee for the same purpose, and a Philippine Antituberculosis Society is certain to follow. The idea of the committee is that the organization should be a very comprehensive one, with the usual officers and as nearly a universal membership as is possible.

The work may be outlined and divided among a number of committees such as an executive committee, a committee on ways and means, one on publicity, another on scientific work, a third on prophylaxis, a fourth on treatment, a committee on statistics, legislation, education, antispitting, and many others.

We are sure to have such an organization, we will have it at once, and, what is more important, it will be a success.

BLOOD PRESSURE IN THE TROPICS. A PRELIMINARY REPORT.¹

By W. E. MCGRAVE and A. G. SISON.

(From the Department of Clinical Medicine, Philippine Medical School,
Manila, P. I.)

Statements suggesting that the lowered blood pressure found in this climate may be considered as one of the etiologic factors in tropical pathology are scattered here and there throughout the literature of tropical medicine, but so far we have been unable to find any published observations showing that blood pressure really is influenced by tropical environment.

We are fully aware of the difficulties in the way of accurately determining what part of any variation may be peculiar to local conditions, as well as to the danger of conclusions which may be drawn from a small series of records. However, the results in the cases so far studied have been so striking that they are offered for discussion and criticism.

All of the cases are healthy adults from 25 to 40 years of age, and for the sake of convenience have been divided into the following three groups:

(a) Ninety-seven foreigners, who are for the greater part Americans from the Philippine Civil Service and officers and soldiers of the United States Army serving in the Philippines.

(b) Forty Filipinos, largely selected from the student class and from the local police forces.

(c) Ten French Sisters of Charity.

Although both systolic and diastolic readings, and, in many cases, tracings have been made, only the systolic records are used in this report. All the determinations have been made with the same Erlanger instrument; the readings have been made by the same persons and, in most instances, the examination has been repeated at least once.

¹ Read at the first biennial meeting of the Far Eastern Association of Tropical Medicine, held in Manila, March 12, 1910.

The important results of the findings are shown by the following tables:

TABLE I.—*Systolic blood pressure of ninety-seven foreigners in Manila, showing influence of duration of tropical residence.*

Residence in Tropics.	Systolic pressure.							Total number of cases.	Average pressure.
	90-100.	101-110.	111-120.	121-130.	131-140.	141-150.	151-160.		
1 month to 1 year.....	1	10	15	18	12	7	2	65	124+
1 year to 5 years.....		4	8	2	1			15	115
5 years to 10 years.....			7	1				8	116+
Over 10 years.....		3	4	2				9	113+
Totals.....	1	17	34	23	13	7	2	97	

TABLE II.—*Systolic blood pressure of 49 Filipinos.*

Sex.	Systolic pressure.					Total number of cases.	Average pressure.
	90-100	101-110	111-120	121-130	131-140		
Male.....	9	8	8	5		30	108
Female.....	4	3	5	5	2	19	113
Totals.....	13	11	13	10	2	49	109

TABLE III.—*Systolic pressure of 10 French Sisters of Charity (24 to 38 years of age), according to tropical residence.*

Residence in Tropics.	Individual readings.	Average.
15 days to 1 year.....	—140, —128, —114, —125	127
1 year to 5 years.....	—115, —110, —110	112
Over 5 years.....	—110, —105, —114	110

TABLE IV.—*Systolic pressure of 140 people of all classes, according to age.*

Age.	Systolic pressure.							Total number of cases.	Average pressure.
	90-100.	101-110.	111-120.	121-130.	131-140.	141-150.	151-160.		
15 years to 20 years.....	4	1	5	7	3			20	117
21 years to 25 years.....	7	13	14	5	5	5	1	56	104
26 years to 30 years.....	2	4	11	8	1	2		28	125
31 years to 35 years.....		3	4	3	1	1	1	13	122
36 years to 40 years.....		7	4	4	2			17	115
41 years to 45 years.....				1	1			2	130
46 years to 50 years.....					2			2	135
51 years to 55 years.....			1					1	
56 years to 65 years.....					1			1	
Totals.....	13	23	39	34	16	8	2	140	

DISCUSSION.

If the figures shown in this report should, after more extensive work, prove to be representative facts, two very important points immediately suggest themselves for solution: (a) The cause or causes for this very decided decrease in blood pressure in the Tropics; and (b) its significance in tropical pathology.

At the present time, our understanding of the physics and physiology of normal blood pressure in general is too incomplete to allow the use of available data as premises for the explanation of the phenomena of lowered blood pressure in warm countries.

The *energy of the heart*, the *peripheral resistance*, the *elasticity of the arterial walls*, and the *volume of the circulating blood* are the four chief factors generally accepted as the principal forces governing the normal blood pressure. All these factors are subject to considerable individual physiologic variation, and, what is more important, as well as more difficult to measure in instituting comparisons, they are so closely connected and interdependent through vasomotor and other nervous influences that changes in one may produce marked secondary effects in the others.

However, in analyzing these four major factors which influence blood pressure with the view of securing an explanation of the lowered tension in the Tropics, it seems probable that the influence of the *energy of the heart* and of the *elasticity of the blood vessels* may be eliminated. While heart and arterial diseases are sufficiently prevalent in the Tropics, all our work in the clinics and autopsy room are against the conclusion that these organs are factors in the general tendency toward lowered arterial tension.

The *volume and viscosity* of the blood have not been studied sufficiently in Manila and we are not familiar with reliable observations upon these factors in other parts of the Tropics. This important subject should be investigated carefully. The literature of tropical medicine seems to support the general opinion that anæmia is almost universally prevalent among people who have lived for some years in the Tropics; but this is by no means proved.

The clinical appearances of pallor of the skin and mucous membranes which are so prevalent are probably responsible for this opinion, but such observations do not necessarily prove that anæmia is actually present. These appearances may be explained in other ways, and work on the blood does not support the conclusions of any such general prevalence of anæmia. The estimation of hæmaglobin by *percentage* methods shows an average which will compare favorably with that of temperate climates and the number of erythrocytes per cubic millimeter of blood will show an equally normal average.

The *volume* determinations of these two points have not, so far as we know, been made on any large series of people in the Tropics, and any opinion as to the presence or absence of anæmia as determined by these methods at the present time would be speculative.

However, to judge from the data which are available, it is much more logical to explain the clinical anæmia as being due to diminished peripheral resistance and lack of the demand for a supply of blood to furnish heat to the skin than it is to assume the condition to be one of true anæmia dependent upon the greater concentration and diminished volume of blood, with a concomitant decrease in actual amount of hæmoglobin and in the total number of red blood cells.

The hypothesis offered in this paper that the anæmia is a *clinical* one *only* is borne out by its very evanescent character, for when patients, particularly children, in whom it is shown most markedly, are transferred to a cooler climate which requires a greater volume of cutaneous circulation, and which also increases the vasomotor tone, the *clinical* anæmia disappears with a rapidity which argues against the supposition that it is due to an actual poverty of the blood. Children who appear to be anæmic not infrequently develop normally tinted skins and mucous membranes within a very few days after having started on an ocean voyage or even after having been transported to the cooler climate of Baguio.

PERIPHERAL RESISTANCE.

Alterations in peripheral resistance as a direct result of the greater and continuous heat of the Tropics offer an attractive hypothesis for the explanation of lowered blood pressure in this climate and the confirmation of such an hypothesis would greatly simplify the study of the etiology of that exceedingly prevalent condition, *tropical neurasthenia*, as well as that of several other generally prevalent tropical clinical entities which usually are considered to be of climatic origin.

The preponderating influence of peripheral resistance in maintaining blood pressure is a proved fact. Unless some counterbalancing change in the force of the heart occurs, increased resistance raises the pressure and decreased resistance is followed by a lowering of the pressure.

Claude Bernard established a vasomotor influence over peripheral resistance, and it is now known that this resistance, both arterial and venous, is largely under vasomotor control and that the vasoconstrictor fibers are those which are principally concerned in this phenomenon. Furthermore, vasomotor tone, in particular of vascular areas, constantly varies in response to *local* needs; increased function always being accompanied by increased blood flow. If such an area be of sufficient extent and the increase is not compensated for by vasoconstriction in other vascular locations, a fall in mean aortic blood pressure follows. The most striking example of this condition is found in the great

influences which the abdominal vessels, enervated by the splanchnic nerves, may exert upon the general blood pressure.

Vasomotor tone is influenced by a number of known agencies and it is often markedly affected by reflexes of remote origin, which often may not be determined in a given case.

Insomnia is often associated with hypertension, and the opposite condition usually prevails during somnolence. Certain conditions of what may be called the *higher neuroses* are accompanied by increased blood pressure, while certain forms of neurasthenia show a hypotension.

Cutaneous and other peripheral vasoconstriction and increased pressure due to cold, as well as the opposite condition due to heat, are recognized facts which suggest a probable influence of this nature in the etiology of the lowered pressure in the Tropics.

It does not seem improbable that this lowered pressure might be explained by lowered peripheral resistance in two ways. While the secretory function of the skin is increased in the Tropics, it is doubtful if this is at the expense of increased resistance, in fact, logically quite the contrary may be expected, and the normal surface resistance and vasomotor tension necessary to produce the required surface heat of temperate climates, in the Tropics is greatly diminished the year around, and in certain seasons is reduced almost to nil. This decreased vasomotor tone may logically be expected to lead to the opposite condition, or to one of stasis which could explain not only some of the variations in mean systolic pressure, but might equally explain the condition of clinical anemia mentioned above, as well as some of the neurasthenias, cerebral anæmias, and acute œdemas of dependent portions of the body which are so prevalent in the Tropics. Another factor which must be taken into consideration is the possibility of splanchnic influences. When we remember the enormous influence which the splanchnic vasomotor tone has upon the general blood pressure, and particularly upon the portal circulation, and also that it is a proved fact that abdominal pressure has a marked influence on the general mean aortic tension, the "tropical liver" and the very prevalent sensation of abdominal vacuity which are partially responsible for the very general tropical custom of abdominal binders may have some scientific foundation.

Gastrointestinal disturbances with secondary clinical manifestations are exceedingly prevalent in this country and it is but reasonable to suppose that these conditions may produce vasomotor disturbances of sufficient magnitude to exert some influence upon the general blood pressure, principally through the portal circulation and splanchnic tone.

In conclusion, we again wish to state that much of the discussion in this paper is hypothetical and offered simply to call attention to the possibilities of continued research in an extremely interesting field in the study of medicine in the Tropics.

TUBERCULOSIS IN THE PHILIPPINE ISLANDS.¹

By ISAAC W. BREWER.²

Tuberculosis is probably the most important disease which is encountered in tropical countries. In the Philippine Islands it is one of the most frequent causes of death. From the statistics gathered during the medical survey of the town of Taytay, Nichols³ came to the conclusion that 1 per cent of the inhabitants had the disease. The statistics for 30 provinces for the year 1907, representing a population of over 4,000,000 persons, showed a death rate of 210.9 per 100,000. This is surely less than the actual rate, for only well-marked cases of phthisis are recorded as tuberculosis by the town secretary, the layman who issues the death certificates.

The following shows the death rate in the Philippine Islands for the year 1907, compared with the rates in other countries.

Death rate per 100,000, from pulmonary tuberculosis.

	Death rate.
Ireland	218.5
Philippine Islands, excluding Manila, 1907	210.9
Norway	200.4
Switzerland	190.7
Germany	181.9
United States, registration area	172.3
Scotland	150.1
Spain	144.3
The Netherlands	138.8
Belgium	127.7
England and Wales	125.7
Italy	117.0

Excepting for the Philippine Islands, the above statistics are for the five years from 1901 to 1905.

In Manila, where the vital statistics are much more accurate, there were, during the year 1908, 10,616 deaths from all causes. Of these, 1,240, or 11.07 per cent, were due to tuberculosis, a death rate of 554.2 per 100,000. During

¹ Read at the first biennial meeting of the Far Eastern Association of Tropical Medicine, held at Manila, March 12, 1910.

² Medical Reserve Corps, United States Army.

³ *This Journal*, Sec. B (1909), 3, 279.

the five years ending with 1908, there were in Manila 5,373 deaths from pulmonary tuberculosis, a death rate of 485.3 per 100,000. During the same period, there were 4,472 deaths from bronchitis, a death rate of 404 per 100,000. Without doubt some of these cases of bronchitis were tubercular.

The following shows the death rate from pulmonary tuberculosis in Manila and certain cities of the United States having approximately the same population. These data are for the year 1908.

	Death rate.
Manila, Philippine Islands	486.2
Indianapolis, Indiana	184.7
Louisville, Kentucky	183.6
Providence, Rhode Island	153.4
New York City, Borough of Queens	125.5
St. Paul, Minnesota	88.8

The statistics presented show that the mortality from tuberculosis in the Philippine Islands, both in the provinces and in Manila, is greatly in excess of the rates in other countries. I believe that this is absolutely unnecessary and that the climatic conditions of these islands are such that the people should lead an outdoor life and be free from tuberculosis.

There is practically no tuberculosis among cattle and hogs in the Philippine Islands. Of 60,000 hogs and 30,000 cattle slaughtered in Manila during the year 1909, not one was found to have tuberculosis. This surely argues against the climate being the cause of the great prevalence of the disease.

From a somewhat intimate association with the natives throughout a considerable area of the Islands, I believe that we can charge this great mortality to the following causes: Bad hygienic surroundings, poor food, and improper clothing.

The habitation of the native Filipino is badly ventilated, and, in most instances, is very dirty. Especially is there a lack of air during the night, when he adds a smoky lamp, further to pollute the air he breathes. An actual count of 200 houses in Manila, of all classes, made about midnight, showed that less than 25 per cent of them had a window open. The thatched cottages of the poorer natives seem to be well ventilated, but should the visitor have occasion to enter one of those buildings at night, the delusion would soon be dispelled.

The Filipino is a great expectorator and deposits his sputum whenever and wherever most convenient, and it is not uncommon to find the wall and the corners of the room soiled with expectoration.

Ninety per cent of the inhabitants are the hosts of animal intestinal parasites. Investigations conducted in Bilibid have shown that these unwelcome guests greatly increased the mortality among the inmates.

The average native seems to be poorly nourished, his diet consisting largely of rice and fish and a little fruit, with an occasional meal of

pork or beef. Much of the fish that is eaten is dried, and a considerable portion of it appears to be decomposed.

Cotton cloth is generally used for clothing and is very inadequate, especially during the rainy season, when shivering natives are a common sight.

The prevention of tuberculosis is receiving the attention of the Bureau of Health, and it is planned to establish a night camp in the vicinity of Manila, and a dispensary for the treatment of cases of tuberculosis is now in operation. The field is large and the resources of the Islands will not allow the sanitary authorities sufficient funds to establish such institutions throughout the Islands. If anything is to be done in combating this disease, the well-to-do inhabitants will have to establish dispensaries and hospitals in the smaller towns. To accomplish this, there should be organized an association, having for its object the prevention of tuberculosis by providing institutions for its treatment and by disseminating the knowledge of the mode of its transmission to the people of the Islands. Were such an association established, it is believed that the philanthropic American citizens who have ever been willing to furnish funds for the establishment of missions in foreign countries would supply money to assist in this campaign.

MALI-MALI, A MIMIC PSYCHOSIS IN THE PHILIPPINE ISLANDS. A PRELIMINARY REPORT.

By W. E. MUSGRAVE and A. G. SISON.

(From the Department of Clinical Medicine, Philippine Medical School,
Manila, P. I.)

Between *spasm* on the one hand, with its more or less appreciable physical pathology, and the true psychoses, with theoretic or intangible mental pathology, on the other, there exists a neuropsychosis which is interesting and important by reason of its prevalence and confusing because of the illusiveness of its pathology. The habit spasm, habit chorea, *tic convulsif*, of the French, and the other true tics, are found toward the material or physical end of this group. Next comes Gilles de la Tourette's disease, or impulsive tic, with its various manifestations which appear to be real tics modified by a coexistent mimic habit. Finally, the saltatory spasms, at least in part, possibly the myriachit of Siberia, probably latah of Java, and surely mali-mali of the Philippines, are not true tics, but directly and exclusively mimic habits.

The underlying etiologic factor in all these conditions probably is very similar: They are expressions of degeneracy. However, the clinical types are so numerous and vary so greatly that in the absence of a tangible pathology and etiology of these affections, much confusion, particularly in nomenclature, exists and not much order will be possible until the former are more definitely established.

Spasm is defined by Meige and Feindel as "the motor reaction consequent on stimulation of some point in a reflex spinal or bulbo-spinal arc. The irritation provocative of the spasm is itself of pathological origin, and no spasm can occur without it." If this definition is accepted, spasm should be less frequently confounded with tic than often is the case, notwithstanding the close relationship and the rather frequent association of the two conditions in the same individual.

Tics are less definite. Charcot¹ considered tic as a psychic disease in a physical guise, the direct offspring of mental imperfection. Ballet² believes that the vast majority of sufferers from tic belong to a class which he designates as "superior degenerates." "The striking feature of these 'superior degenerates' or unstabiles

¹ Lecons du mardi (1887-88), 124.

² Traite de medecine, 6.

is not the insufficiency, but the inequality of their mental development. Their aptitude for art, literature, poetry, less often for science, is sometimes remarkable; they may fill a prominent place in society; many are men of talent, some even of genius; yet what surprises is the embryonic condition of one or other of their faculties. Brilliance of memory or of conversational gifts may be counteracted by absolute lack of judgment; solidity of intellect may be neutralized by the more or less complete absence of moral sense."

Meigs and Feindel² call particular attention to the practically constant "mental infantilism" as a feature in the character of the patient suffering from tic. Mental infantilism is evidenced by inconsequence of ideas and fickleness of mind, reminiscent of early youth, and unaltered with the attainment of the years of discretion.

Mere repetition does not, can not, evolve a tic except in patients with psychic predisposition in the shape of volitional enfeeblement. This degeneracy may consist of decrease, absence, arrest or delay, or in overgrowth, increase, exaggeration; and these contrary processes may coexist in the same individual.

Muscular spasm and other requirements of true tic are present in such conditions as Gilles de la Tourette's disease, and to them are added echolalia, echokinesia, echokinemia, and other forms of mimicry. In some of the saltatory spasms, particularly latah, and positively in mali-mali of the Filipinos, the *autospasm* which is the distinguishing feature of true tic is absent and we have in its place only an uncontrollable mimicry, manifesting itself in various ways, but principally as echolalia and echokinesia or echokinemia.

Meigs and Feindel,² in discussing tics, state that echolalia and echokinesia, in spite of their frequency among those who are addicted to tic, can not be enumerated with the tics, because their exhibition is dependent on the actions of others; whereas once a tic is established it requires no stimulus from without for its manifestation. Of course, their affinity to the tics is very close; they spring from the same soil; they represent in the adult the persistence and amplification of the child's propensity for imitation, and, therefore, in their own way postulate a degree of mental infantilism.

Although these and other forms of mimicry are thus recognized as being independent of auto-stimulation, they are generally classified as tics and, except in the discussions of latah of the Malays by O'Brien, Guinon, Scheube, and others, we have found no literature recognizing the existence of the condition, except as a manifestation in patients suffering from some form of tic.

The "running amok" common among some tribes of the Malays is of particular interest to medical men in the Far East. This disease or one very similar to it is quite common among the Moros of the Philippine Islands, and a number of soldiers and others have fallen victims to

² Tics and Their Treatment (1907).

³ *Loc. cit.*

fanatical "*juramentados*"⁵ during the period of our residence in the southern parts of the Archipelago.

Amok is a Malay word and translated means a frenzied desire to murder. It is a neuro-psychosis belonging in the group with Tourette's disease, and should be classified with the tics, at least to the extent that the spasm in both "running amok" and "*juramentado*" may be autogenetic and may exist entirely independent of any outside influence. The attacks are brought about in two ways. In one it is preceded by days of melancholic stupefaction in which the patient becomes morose, gives up work, and avoids his fellows. In other instances, and particularly in "*juramentados*," the attacks are brought on by religious rites, incantations, music, dancing, and other methods of psychic stimulation similar to the war dance used by the American Indians. In either case, when a sufficient frenzy is reached, the afflicted person suddenly runs into a crowd of soldiers or other people, or through the streets of a town, and with his *kris*,⁶ or among the Moros of the Philippines, with his *barong*,⁷ kills whoever may come in his way regardless of age, sex, race, or any other of the usual considerations of affection or fear. One of these patients will charge into a company of armed soldiers with the same recklessness as into a group of defenseless women or children. The fanatic is either killed on the spot, or the attacks last from a few hours to days and usually are terminated by exhaustion or suicide. This disease occurs almost entirely among men.

However, it has a close but much less dangerous and less severe counterpart in a very common and previously undescribed condition among Filipina women, a condition called *dalahira* by the natives and which really consists in a frenzied desire to quarrel. A woman so afflicted will begin to quarrel with a relative, friend, or entire stranger, and will rapidly work herself to a perfect frenzy of speech and gesticulation, without any apparent object. This frenzy may continue for hours, or until terminated by exhaustion, only again to be repeated as opportunity affords. This disease is not the usual expression of anger for cause, but a habit tic or frenzy.

Probably the affection most closely resembling mali-mali of the Philippines is *latah*.

Indeed, Scheube and some other experienced observers regard the diseases as identical. Scheube⁸ considers *latah* as a form of cerebral neurosis characterized by involuntary movements and incoherently uttered sounds or words. The movements are introduced, accompanied or followed by disconnected sounds or words. The symptoms may arise from fright and may be continued indefinitely as a form of mimicry. All of these patients are easily alarmed, they are for the greater part women of the poorer and more ignorant classes, and heredity seems to play a part in the etiology of the disease.

⁵*Juramentado*. A term used by the Spaniards and still continued, designating a Mohammedan (Moro) fanatic, who, after certain religious rites, undertakes to kill whom he can until he himself is killed.

⁶A long wavy-edged dagger.

⁷A heavy knife with an approximately straight back and a curved edge. In the Philippines the *kris* is a ceremonial sword.

⁸Diseases of Warm Countries. Jena, 2d ed., (1903), 514.

Scheube⁹ believes the malady to have something to do with suggestion in persons with weak will, and Van Brero¹⁰ considers it to be due to the defective development of will power in the Malay. The latter author defines the disease as "provoked imitative impulsive myospasm." Scheube thinks that *latah* is identical with *mali-mali* of the Filipinos and he further includes as synonyms *bohatchi* in Siam, *yaun* in Burma, *myriachit* in Siberia, and *jumping* in North America.

Tics are quite frequently encountered among the Filipinos, particularly of the upper class, and *mali-mali*, mimicry, echokinesia, echolalia, echokimemia, or other form of mimic habit, without the presence of tic, are considered to be quite prevalent among the lower class of Filipinos, almost exclusively in the females.

The observations of Charcot and Ballet as to "superior degeneracy" as an origin of tics is borne out here, at least to the extent that cases of tic are for the greater part encountered among the higher classes, and particularly in suggestive relation to genius. With *mali-mali* the opposite condition is found, the cases all occur among the lower classes of the community, mostly among women and in the presence of a mentality which is so primitive that it may hardly be used for comparative purposes.

While the physician hears of many cases of *mali-mali*, they are difficult to bring under observation in the hospitals, but the following typical case has been carefully studied in St. Paul's Hospital and may be reported.

Case 1. Mali-mali, echolalia, echokinesia, echokimemia.—Isabel de la Cruz, female, Filipina, widow, occupation washerwoman. Stated age 59 years, but appears much older. Has taken about 30 grams of *vino* daily since she was 18 years old and smokes a moderate number of cigars. Venereal history is negative. No history of hereditary tendencies has been found. Menstruation has always been normal and regular and ceased without marked disturbance at the age of 37. She was married at a very early age and has given birth to six children, all of whom are living and free from symptoms of *mali-mali*. There is no history of important previous illness.

Present illness.—The patient states that she was a very nervous child, easily frightened, and that this condition was aggravated by the pranks of her associates. When quite a young girl she was much in contact with an older woman suffering from mimic habit and our patient believes her condition to have been acquired from much practice in forcing the older woman to imitate words and actions. The mimic habit when once started progressed rapidly, and reached its present status of echolalia and echokinesia when the patient was still a young girl.

Present condition.—The patient was admitted to St. Paul's Hospital because of a slight accident and the mimic habit was accidentally discovered after she had been admitted to the ward. The psychosis is a typical mimic habit, confined to echolalia, or mimicry of words, and echokinesia, or mimicry of movements. There is no tic or other muscular spasm, no autostimulation or desire to continue any abnormal sound or movement, except by direct stimulation by sight and sound from some person acting as mentor. What may be called her receptive stage is only obtained by first securing the patient's close attention, which may

⁹ *Loc cit.*

¹⁰ *Allg. Ztschr. f. Psych.* (1895), 2, No. 5.

be done by sudden loud exclamations or quick, spasmodic movements. After attention is thus secured, a remarkably consistent mimicry of words, sounds, and actions may be continued at the will of the operator. The performance resembles that seen in mesmerism, and the face of the patient during these times has the blank, uncertain character of a person under hypnotic influence.

Physical examination of the patient is practically negative. The patellar reflexes are slightly exaggerated, there is no disturbance of sensation; attention, memory, and coördination are good, and there is absolute freedom from muscular spasm of any kind. The mental condition is equal to that of the average poor, ignorant person of her station in life.

In summarizing this case and that of three others, which are not given in detail, it may be stated that they are free from any form of muscular spasm, explosive utterance or other evidence of autospasm or tic. They are characterized by the existence of a temporary abulia, or even by a kind of hypnotic state as it were, under the influence of another person. The presence, amount, and character of the echolalia, or mimicry of words, as well as that of the echokinesis, or mimicry of actions, are entirely under the control of the person influencing the patient.

In order to control one of these patients, unless an extreme degree of susceptibility is present, it is first necessary to secure her attention by a sudden movement, noise, or quick exclamation in a rather loud voice. After this has been accomplished the mimicry may be continued at the will of the operator with no especial effort or concentration.

CONCLUSIONS.

1. The peculiar mimic psychosis in the Philippines known by the local name mali-mali is closely related to, but distinct from, the tics.

2. Such somewhat doubtful tics as Gilles de la Tourette's disease, jumping tic of Beard, myriachit of Hammond, saltatory cramp of Baberger, latah of O'Brien, tarentism, and the saltatory tics in general, have much in common with the Philippine affection, but in all of these, with the possible exception of latah, there are indications of autospasm which is lacking in the local disease.

3. Ramaneniana, the dancing mania of Ramisiary, St. John's, and St. Guy's dance, and perhaps other allied conditions, are more nearly hysterical manifestations; and while they have much in common with mali-mali they all show evidences of autostimulation, and when once established are capable of prolongation without any outside influence.

4. Mali-mali is probably an expression of mental degeneracy similar to that generally accepted for other conditions of the same group. However, its clinical manifestations do not fully agree with those given for any other similar disease, and for this reason it is classified, tentatively at least, as a *clinical* entity.

DISCUSSION ON THE PAPER, "STATISTICAL STUDIES OF
UNCINARIASIS AMONG WHITE MEN IN THE PHIL-
IPPINES," BY DOCTOR CHAMBERLAIN.

Dr. Aldo Castellani, professor of tropical medicine and lecturer on dermatology, Ceylon Medical College, delegate from the government of Ceylon.—I would like to say just a few words in regard to Major Chamberlain's paper, which is a most interesting one. The subject of uncinariasis is one of great practical importance in the Tropics and in subtropical countries. In some districts of Ceylon about 65 to 75 per cent of the people are affected with uncinariasis.

I think Doctor Chamberlain is quite right when he says that even a small number of agchylostomes is of great importance, as secondary bacterial infections may take place through the small lesions produced by them in the intestinal mucosa.

In connection with uncinariasis, I would call attention to a symptom seldom mentioned in text-books: *Fever*. If a temperature chart be kept of all uncinariasis patients, it will be found that in about 20 per cent of the severe cases, fever is present. This fever is generally of a low type, intermittent or remittent, rarely continuous.

Dr. E. R. Stitt, surgeon, United States Navy, associate professor of medical zoölogy, Department of Tropical Medicine, Philippine Medical School, Manila, P. I.—In connection with the question of the period of time a man may remain infected with the hookworm in the absence of the possibility of the removal of the infection, the experience at the United States Naval Medical School with the infection of dogs with *Agchylostoma* is interesting.

In the school there are two classes, one of which, in the practical study of medical zoölogy under Doctor Stiles, performs autopsies on dogs killed at the municipal pound during the autumn months, and the second class do their work in the late spring months. We have observed that the dogs autopsied in the autumn show very heavy infections, while in those autopsied in the spring the hookworms give very small numbers. These observations extended over several years. From this it would seem that the dog became free of his infection during the winter and reinfected himself the following summer. When one considers the formidable teeth of the dog hookworm imbedded in the intestinal mucosa, it would seem that at any rate *Necator americanus*, with only chitinous plates, should be more readily eliminated by man.

Dr. Victor G. Heiser, Director of Health for the Philippine Islands, professor of hygiene, Philippine Medical School, Manila, P. I.—The paper of Major Chamberlain is an excellent résumé, presented in an interesting manner, of the work done in connection with the hookworm and serves as an example of how wrong deductions may be drawn from an insufficient number of observations. For instance, as a result of the 4,000 or more stool examinations which were made of the prisoners at Bilibid, over half of the prisoners were found to be infected with hookworms, and by eliminating these parasites the mortality was reduced from 75 to 12 per cent per thousand. There seemed to be no question that the reduction in the mortality was due to the elimination of intestinal parasites, and more especially the hookworm, because the treatment was carried out by brigades, which consisted of 300 prisoners, and more than a year was consumed in this work, and the death rate fell among those prisoners who had been freed of their intestinal parasites. At that time many medical men were inclined to reason that the same percentage of infection must exist among the general population, and that if the intestinal parasites could be eliminated a mortality rate as low as that found in the Temperate Zones might be obtained in the Philippines. However, since it was shown that the percentage of infection among the general population was not over 15 and that the majority of those examined showed no symptoms, it was evident that no such improvement in the mortality rate could be expected.

Dr. Gilbert E. Brooke, port health officer, Singapore, delegate from the Straits Settlements, Singapore.—In Singapore we have not had much experience with this disease. On the quarantine station we do a certain number of post-mortem examinations of coolies who die at the station, but it is very rarely that we find many cases of this infection. During a cholera epidemic on the station, I found at one time that eucalyptus oil, which we were giving as a cholera prophylactic, resulted in the expulsion of numbers of *agchylostomes*. This oil might therefore prove a nonirritating and useful vermifuge.

Dr. J. M. Atkinson, principal medical officer, Hongkong, delegate from the government of Hongkong.—I quite agree with Doctor Castellani in thanking Major Chamberlain for his interesting paper. Was there not any record in the old Spanish days of the presence of *Agchylostomum duodenale* in the Philippines?

Cases are seen at the Government Civil Hospital, Hongkong, but this disease is not common there and the parasites are generally found when examining the stools of patients admitted suffering from other diseases.

If, as I understand Doctor Chamberlain, the white troops from the United States have in all probability introduced *Necator americanus* into these Islands, could not this be prevented by a special medical examination of those men before leaving the States?

Where in the United States is the *Necator* prevalent, and what is the cause of this prevalence? It would be of interest to know the name of the variety found in dogs.

I am afraid my remarks are full of questions. My only excuse is that we delegates are thirsting for information.

Dr. Paul C. Freer, Director, Bureau of Science, dean, Philippine Medical School, Manila, P. I., president of the Far Eastern Association of Tropical Medicine.—Can any one give us the name of the hookworm in dogs?

Dr. Richard P. Strong, Chief, Biological Laboratory, professor of tropical medicine, Philippine Medical School, Manila, P. I.—The species of hookworm found in the dog is the same species, *Agchylostoma trigonocephalum*, which has been described in Europe as giving rise to the pernicious anæmia of hounds.

Dr. Isaac W. Brewer, Medical Reserve Corps, United States Army.—Has the American form been found among the Filipinos?

Dr. W. P. Chamberlain, Major, Medical Corps, United States Army, president of the United States Army Board for the Study of Tropical Diseases as They Occur in the Philippine Islands.—In regard to the last question, all the records that I have seen mention only the American hookworm. I have not seen a report of any other. The American hookworm was first described by Stiles in 1902 and therefore the Spanish records prior to the American occupation would not show its occurrence. Previous to 1902 all human uncinaria were referred to as the *Agchylostomum duodenale*. The occurrence of uncinariasis among American soldiers who had never been out of the United States was entirely overlooked until Siler's work in December, 1908. Therefore, the physical examination given in the past to soldiers about to start for tropical service had not included a search for intestinal parasites. At the present time it is the practice at some and perhaps at all recruiting stations to examine the stools of recruits at the time of enlistment and treat all whose stools show ova. Practically all of the infected soldiers I have seen were so mildly infected that the condition would be entirely unsuspected on ordinary physical examination. That the *Necator americanus* if present among whites, may cause very marked and serious symptoms has been shown by investigations in the Southern States and among natives in Porto Rico. *Necator americanus* has been found commonly among the Filipinos.

I suppose, Doctor Castellani, this hookworm is found in Ceylon?

Doctor Castellani.—We have both species.

Doctor Chamberlain.—Has anyone seen *Agchylostomum duodenale* of late years in the Philippines?

Doctor Strong.—Both species, *Uncinaria duodenale* and *Necator americanus*, are found here. Doctor Garrison has recently identified specimens which are deposited in the museum of the Biological laboratory. I first

reported the presence of *Agchylostomum duodenale* in the Islands in 1900. At that time the species *Necator americanus* was not known, but the anatomic description given of the parasite encountered here shows that the species then described was not *Necator americanus*.

DISCUSSION ON THE PAPER, "MYZOMYIA ROSSII AS A
MALARIA-CARRIER," BY DOCTOR VOGEL.

Doctor Strong.—I am very much interested in the results of Doctor Vogel's experiments. About two years ago Mr. Banks, of the biological laboratory, reported that *Myzomyia ludlowii* was capable of transmitting malaria in the Philippines. We now know that this species is identical with *Myzomyia rossii*. During the past year in connection with the work in the courses of tropical medicine in the Philippine Medical School relating to the study of malaria, we attempted to infect numerous specimens of *Myzomyia rossii* by exposing patients suffering with severe cases of æstivo-autumnal and tertian malaria to their bites. However, although these experiments were extensive and were carried on over a period of several months during the autumn, they were entirely unsuccessful. In no case did the dissection of any of these mosquitoes, although a large number were examined, reveal any oöcysts in the walls of the stomach, and in the study of stained sections made of the salivary glands no sporozoites could be detected. Later attempts to infect other human beings by the bites of specimens of *Myzomyia rossii* which had been previously fed on the blood of patients suffering with severe malaria and whose blood certainly contained gametes, also failed. The larvæ of these mosquitoes were collected in the estuaries about the city.

In connection with Doctor Vogel's experiments the results we obtained are interesting. We know that these estuaries are affected by the tides and that more salt water would naturally enter them when the tides are high and that after the season of the high tides has passed, more salt would therefore be deposited in the marshes. In this way the breeding places of these mosquitoes would at times contain a greater amount of salt than at others.

I do not recall at what time of the year Mr. Banks' experiments were made. It would certainly be important to ascertain what effect, if any, these changes in the character of the breeding places would have on the transmission of malaria by *Myzomyia rossii*.

Mr. Charles S. Banks, Biological laboratory, Bureau of Science, lecturer on medical entomology, Department of Tropical Medicine, Philippine Medical School, Manila, P. I.—The paper by Doctor Vogel is certainly a very interesting one in that he has emphasized practically the same conditions that I found at Olongapo, in my work upon the transmission

of malaria by *Myzomyia rossii*.¹ I might also say that in the Province of Lepanto-Bontoc, where the town of Cervantes is situated, many miles from any possibility of salt-water influence, I found this mosquito breeding in sluggish streams of purely fresh water. The parasite was found in great abundance in the blood of the natives at this latter place. I may state, in referring to the question of the saltiness of the water, that I did my first work at Olongapo, where I bred this mosquito. Topographically, Olongapo is like Manila, except that the ramifications of the land are not so extensive and all the estuaries in the vicinity are affected by the water of Subig Bay, which is as salty as that of Manila Bay and the China Sea.

I doubt very much if the mosquito in Manila could be said to breed in water which is not salt. As far as I have found, this mosquito is prevalent only in the estuaries of Manila that are distinctly affected by rising tides.

DISCUSSION ON THE PAPER "ANTIMALARIAL PROPHY-
LACTIC MEASURES AND THEIR RESULTS AT THE
NAVAL STATION, OLONGAPO, P. I.," BY
DOCTOR DUNBAR.

Mr. Banks.—The observations of Doctor Dunbar are identical with my own at Olongapo. It was certainly true that the largest percentage of Marines who had malaria had been sent to the navy rifle range for target practice and were therefore in a region abounding in malaria. As Doctor Dunbar says, there was a great increase in malarial infection as the dry season advanced.

I have a map, which anyone may see who wishes to, which shows the topography of Olongapo and also the location of the mosquitoes as I found them. The point regarding the inadequacy of mosquito nets was also brought out by me in my paper. The different seasons of the year strongly influence the abundance of the mosquitoes. It is a well-known fact that they can not exist during the rainy season. The hard rains destroy them, as the larvae remain on the surface of the water. During the dry season there is no such menace to their existence.

Doctor Hight.—I should like to refer to two interesting measures on antimalarial work which were carried out in Siam, one of which was of special interest.

The first experiment was performed on the old quarantine station of Bangkok, situated on the Island of Koh Phai, in the Gulf of Siam, and some few miles from the mainland. There *Anopheles* mosquitoes abounded and malaria was of a very severe type, but after carrying out

¹ *This Journal, Sec. B* (1908), 3, 335.

the usual work in accordance with the instructions of Ross, mosquitoes disappeared and along with the malaria. Quinine, which formerly was employed by ounces per week, was no longer necessary. This is a typical case of success following upon the destruction of the breeding grounds of the *Anopheles*.

Being compelled to change the site of the quarantine station, another island was chosen, Koh Pha. Upon landing upon this island for the purpose of determining the suitability of it for a quarantine station, a small marsh was found teeming with *Anopheles* of a very virulent nature. Nevertheless, this island was fixed upon for the location of the station, buildings were erected for the staff and coolies, and, although fever was common at first even under the influences of prophylactic doses of quinine, the results of antimalarial methods soon became evident. However, while the police and the general staff of servants, etc., began to show freedom from malaria, the medical officer, his wife and family continued to suffer severely from fever. Being certain that there was a flaw somewhere, I visited the station, and after a careful inspection of the whole station discovered a water jar at one corner of the medical officer's house, half full of water and teeming with *Anopheles* larvæ. These were destroyed and now that medical officer's successor and his wife and children enjoy excellent health.

Dr. Henry Page, major, Medical Corps, United States Army, Manila, P. I.—I understand from the Spanish records that the post of Parang in Mindanao was considered one of the most deadly in the Philippine Islands. At the present time there is practically no malaria there and very few mosquitoes. After the post itself was almost entirely free from malaria, a marsh was found near the last barracks which appeared to have an influence upon malaria, so we finally had it drained. The result was, the soldiers testified that whereas before they never were able to sleep at all because of the mosquitoes, they now never see a mosquito.

At another part of the post where the people were complaining of the mosquitoes, I had banana trees and ornamental shrubs cut away and thus rid the fort of mosquitoes. The point emphasized is that a marsh several hundred yards from the post supplied a bountiful crop of mosquitoes, even though the prevailing winds blew from the post toward the marsh; and, second, that banana plants can breed mosquitoes in a country where frequent, gentle showers and heavy dews fill up the cup between the stalk and its junction with the leaf.

Just a word as to prophylaxis in the field in regard to the protection of the men from mosquito bites when asleep under their nets when the arms and feet usually were thrown against the net offering opportunities of exposure to the insect, I requested soldiers to put their beds together in pairs with the sides of their individual nets tied close together. By doing this, they were able to escape from the unprotected sides of their

nets to the protected side, and I observed that when such an arrangement was made few men suffered from the insects. Of course, it is very objectionable for people to sleep together, for many reasons, but in cases like this it seems advisable.

Major Hooton, J. M. S., Rajkot, Kathiawar, India, delegate from the government of India.—I have listened with great interest to Doctor Dunbar's paper and think that, especially at the present time, when it appears to be the opinion of some authorities that prophylaxis by mosquito destruction, on the lines recommended by Ross, is for the most part impracticable on the score of expense and for other reasons, it is most important that instances in which it has been successful should be put on record. Personally, my own experience entirely corresponds with that of the previous speakers. I have lived in several Indian stations where a notable decrease of mosquitoes has followed the usual measures of destruction, and have recorded, in one instance, an almost total disappearance of malaria and I think it is obvious that under the conditions prevailing in many Indian towns and villages action on these lines, properly carried out, must meet with success. There are, of course, certain localities where quinine is the only possible means of prophylaxis, but I would urge that these are exceptional and that quinine should be regarded on the whole as of secondary importance to the destruction of mosquitoes. Another point is that the abolition of collections of waste water goes hand in hand with general sanitary measures.

I think it would be an excellent thing if the opinion of this meeting could be taken as to the general practicability or otherwise of Professor Ross' measures.

Doctor Atkinson.—Our experience in Hongkong, during the past ten years, have proved entirely confirmatory of the beneficial results arising from applying Professor Ross's method of mosquito destruction in a malarial district. I have instanced the case of MacDonald Road in Hongkong. Malaria was very prevalent there in 1900 and 1901. In the winter of 1901 and 1902, active antimalarial measures were carried out, viz, removal of brushwood and undergrowth around the house, training of the nullahs and drainage of all collections of standing water. In addition, an active fumigation with sulphur of the coolie quarters attached to the houses was carried on. The result is that now in the district where previously malarial fever was very prevalent, no cases occur.

Doctor Brooke.—While most of us seem agreed on the admirable results which can be obtained by mosquito destruction, quinine prophylaxis, and general sanitary measures, no speaker has yet mentioned the valuable aid to antimalarial campaigns which can be rendered by legal enactments.

Ordinances have recently been passed in the British East Indies making it a legal offense on the part of a householder or occupier to have any living

mosquito larvæ in any vessel or collection of water within his household or compound.

In large, native, tropical towns this might offer some difficulties, but in a town with such excellent sanitary methods and administration as yesterday we had demonstrated to us in Manila, the addition of a "larva column" to the householder's sanitary sheet might be a feasible matter.

Doctor Francis Clark, medical officer of health, delegate from the Government of Hongkong.—Doctor Dunbar has told us that by clearing and filling within a radius of 200 feet around the buildings at Olongapo malaria disappeared, but I am of the opinion that this will only be for a time. In Hongkong we have, as you know, to deal with mountain streams, and it is no easy matter to train these streams by confining the water to one smooth channel throughout so as to prevent the development of mosquito larvæ. Just to show you what occurred in one district: In the western section of the city are many European houses, and near these houses are several streams. The nearest stream was examined for *Anopheles* larvæ and many found in it. This stream was within about 30 to 50 yards of the nearest houses. The next stream, further west, was at this time found to contain no *Anopheles* larvæ; and so with the others, still further west. The first stream was trained and confined to a smooth channel in which mosquito eggs and larvæ could find no lodgment. The result of this work was that malaria disappeared from this district. This condition lasted two or three years and then malaria again broke out. I went, together with Doctor Thompson, our mosquito expert, and thoroughly examined all these streams, both trained and untrained. The trained streams were clear of larvæ, there being no possibility of their lodging there, owing to the fact that these trained streams are all carefully watched, defects remedied and the channel scrubbed once a week with hard brushes to prevent the growth of algæ at their margins, as we have found that the latter will serve for the development of mosquito eggs.

In the first untrained stream, however, *Anopheles* larvæ had now appeared. This seems to indicate that *Anopheles* like the neighborhood of houses, and when they are driven out from the immediate neighborhood of a dwelling they will, in the course of two or three years, appear in the nearest stream and many find their way thence to the houses, if the latter are within flying distance. What the limit will be I can not tell, but we hope 400 yards will be sufficient. We must push our efforts certainly a quarter of a mile from the nearest dwellings, and even then it is necessary to watch the nearest water courses for the reappearance of *Anopheles* larvæ.

Mr. Banks.—I would like to say that we can not give too much attention to the habits of the different species of mosquitoes. I have always found *Myzomyia rossii* Giles and other *Anophelinae* breeding in running water which had some current in it and in which green algæ were to be found growing in the surface, as you will see in the specimens

downstairs in the exhibit. Mosquitoes have habits as distinct as domestic and wild animals, such as the dog, the cat, the lion, the bear; and the only way intelligently to combat them is by first obtaining an intimate knowledge of their habits.

Doctor Castellani.—Malaria prophylaxis based on mosquito destruction is of the greatest importance, and I am very much in favor of it, but at the same time we should not forget how useful quinine prophylaxis also is. I would call attention to the splendid work of Professor Celli in Italy. He has succeeded in having passed through both houses of Parliament laws by which quinine is manufactured by the State and supplied *gratis* to the poor people in the malarial districts of Italy. These legislative measures have been taken up by Greece and Roumania and the results have been most satisfactory.

DISCUSSION ON THE PAPER "INCIDENCE AND COMPLICATION OF MALARIA IN THE PHILIPPINE ISLANDS,"
BY DOCTOR BOWMAN.

Doctor Castellani.—Doctor Bowman's paper has been very interesting to me. In Ceylon I have come across many cases of sequelæ and complications of malaria, and I agree with Doctor Bowman that a neuritis, sometimes a polyneuritis, may be of malarial origin.

I have not had much experience in regard to the treatment of malaria with atoxyl. I treated three cases with it, but the results were far from being encouraging. I gave about one-half gram every two days. In one case I had to discontinue the treatment because the patient developed symptoms of arsenical poisoning. As regards arsenophenylglycin, I have not had any experience, but this drug has been shown by Doctor Bowman to have no effect in malaria and may produce symptoms of arsenical poisoning.

Referring to the treatment of filariasis, I have made some experiments with atoxyl and other drugs and in my experience all of them are useless. However, it has seemed to me that in some cases of chyluria there is a slight benefit from the administration of methylene blue.

DISCUSSION ON THE PAPER "NOTES ON CONTAGIOUS
OPHTHALMIA," BY DOCTOR BROOKE.

Doctor Chamberlain.—I am much interested in the subject of Koch-Weeks conjunctivitis because the Army Board for the Study of Tropical Diseases, of which I am a member, has been investigating for two months an extensive epidemic of conjunctivitis among Filipinos on Carabao and Corregidor Islands at the entrance to Manila Bay. There

are about 4,000 native laborers employed there in building emplacements for artillery, and during the last year and a half about 1,000 cases of conjunctivitis have occurred. As many of these men have been sent away incapacitated, it is probable that they are spreading infection in their native towns.

We have seen 25 cases of this disease, all presenting severe generalized injection of the bulbar and palpebral conjunctiva. In several cases there were ulcers of the corneal periphery, and in one a large ulcer on the inner surface of one upper lid. The discharge was mucopurulent and never of great amount. Smears were taken in 12 cases and in each one the Koch-Weeks bacillus was demonstrated, sometimes in large numbers. Cultures made on human (Filipino) serum agar gave in four cases a mixed growth of staphylococci and bacilli conforming in size and shape to the Koch-Weeks bacillus. We were not able to obtain a pure culture. Other observers in the Islands have at times demonstrated the Koch-Weeks bacillus in smears from the eye, and it is probably a common and important cause of conjunctivitis here. Major Rutherford, who treated several cases of this disease at the Division Hospital, found argyrol promptly effectual. Isolation is very important, as the disease is extremely infectious, the spread probably being mainly by direct contact and by infected droplets expelled from the mouth and nose.

Doctor Atkinson.—I was very much interested in Doctor Brooke's paper, especially as the presence of trachoma occurring among Chinese emigrants leaving Hongkong has been a very vexed question. I refer especially to those proceeding to the ports of the United States. I was glad to hear the confirmatory conclusions of Doctor Brooke, that trachoma is a distinctly rare disease among the Chinese emigrants at Singapore.

The presence of a *Gram-positive organism* in many of the cases, distinct from the Koch-weeks bacillus, is also worthy of note. I would like to ask Doctor Brooke whether this is easily seen in a smear of the conjunctival discharge, in other words, the technique of finding it.

Doctor Strong.—I would like to ask Doctor Brooke and any others present who have studied epidemics of conjunctivitis in tropical countries from a bacteriologic standpoint, as to whether they have encountered the *Bacillus xerosis* in any of their cases? In 1900 I studied in the First Reserve Hospital in Manila a number of cases of conjunctivitis from which *Bacillus xerosis* was isolated. This organism is easily cultivated. Inoculation of animals with the Gram-positive organism described by Doctor Brooke might aid in elucidating the nature of the organism.

Doctor Castellani.—I think Doctor Brooke should be congratulated on his interesting address. Sir Allan Perry and myself, in the last four years in Ceylon, have investigated a large number of cases of conjunctivitis among the natives and Europeans. In some cases we observed the Koch-Weeks bacillus, which we found most difficult to cultivate. In

some other instances we encountered the diplobacillus of Morax, and in about 15 or 20 per cent and in a certain number of normal people we found a Gram-positive, nonmotile organism which we considered identical with the *Xerosis* bacillus.

Dr. Henry Fraser, director, Institute for Medical Research, Kuala Lumpur, delegate from the government of the Federated Malay States.—Some five years ago I took part in an extensive investigation on the bacteriology of conjunctivitis. We devoted the first year to learning methods and thereafter made a bacteriological and clinical examination of every case of conjunctivitis admitted during one year to the ophthalmic department of the hospital and the public dispensary. Nearly 1,000 cases were dealt with in this way.

Conjunctivitis caused by the Koch-Weeks bacillus is an acute infection. A lotion of boric acid to remove the discharge and keep the eyes clean is all that is necessary.

Conjunctivitis caused by the diplobacillus most frequently runs a chronic course. It can readily be cured by the instillation of drops containing zinc sulphate. These drops sting when they come in contact with the conjunctiva, so that the treatment in the hands of laymen may prove ineffective, but when properly applied a cure must result. The use of silver salts in either of these forms of conjunctivitis is unnecessary.

The cultivation of the Koch-Weeks bacillus is easy on ovarian agar. The bacillus staining by Gram and described by Doctor Brooke is in all probability the *Bacillus xerosis*. This organism is frequently found in cases of conjunctivitis, as has already been stated.

Dr. Allan J. McLaughlin, passed assistant surgeon, United States Public Health and Marine-Hospital Service, Assistant Director of Health, assistant professor of hygiene, Philippine Medical School, Manila, P. I.—I regret very much not hearing the first part of this interesting paper. I wish to state that I have never yet seen a case of conjunctivitis which did not clear up in a very few days regardless of what bacillus was present. I agree with Doctor Brooke that the first stage of trachoma is indistinguishable from acute conjunctivitis of other kinds. In the rejection at Naples of 15,000 Italian immigrants embarking for the United States, this fact was considered and all having acute conjunctivitis were held. Many cases could then be passed after ten days as not having trachoma. In fact, ten days' treatment usually cleared up a case of simple, acute conjunctivitis, while real trachoma persists after the treatment and goes on to new tissue formation, ulceration and cicatrization. There is absolutely no relation between the conjunctivitis which clears up and trachoma. The two must not be confused. Trachoma is always chronic and is never cured in the acute stage.

Doctor Brooke.—Doctor Atkinson asked a question in regard to the technique. This is relatively easy, even a wooden match will do quite as

well as a platinum loop. Get a small flake of mucus from the conjunctival sac and prepare the slide with this, when any organisms present may be seen.

With regard to the possibility of the Gram-positive organism being identical with the *Bacillus xerosis*, I was led to think that they were separated entities from the fact that even in old cultures there were no involution forms of a *diphtheroid* shape. I had always considered *Bacillus xerosis* as not being in any way pathogenic, but merely adventitious as in the case of spirochaetae. The bacillus in any sense seemed sufficiently constant to be causal, but the possibility of identity with *Bacillus xerosis* might certainly be considered, as *Bacillus xerosis* is polymorphic.

With regard to acute conjunctivitis clearing up in a few days and trachoma being an acute disease, I attempted to bring this fact out in my paper.

In referring to the question as to whether acute catarrhal conjunctivitis can be differentiated from the preliminary conjunctivitis of trachoma, by its amenability to treatment, I will state that the point I wished to emphasize was that the condition is the earliest symptom of trachoma and in mild cases the connection between the two might be overlooked, with grave results.

— —

DISCUSSION ON SIR ALLAN PERRY'S PAPER, "THE PRESENT POSITION OF THE LEPER IN VIEW OF THE RESOLUTIONS PASSED AT THE INTERNATIONAL CONFERENCE ON LEPROSY AT BERGEN, 1909."

Major Hooton.—It seems to me rather early to condemn Professor Deycke's treatment. Not long ago I had an opportunity of seeing a number of lepers at the Matunga Asylum in Bombay who had been injected with nastin for various periods, and there were among them many cases of the nodular form of the disease which, to judge from photographs previously taken, and from the statements of the patients themselves, had improved very markedly as regards both the local and general conditions.

Doctor Atkinson.—This disease is rife in the Philippine Islands, in China and elsewhere in the Orient. Plague is also rife, and since this is the first time delegates have met in this way, in order that some practical conclusions may be arrived at by this congress, I move that subcommittees be appointed to consider and report to the association before the 15th instant what measures they recommend in connection with the following: Leprosy, plague, and quarantine regulations regard-

ing infectious diseases. We have here delegates from practically all countries east of Suez, from India, Ceylon, the Straits Settlements, Netherlands-India, Siam, Hongkong, China, and Japan, and we have a grand opportunity for formulating conclusions. If we put off this question until the business meeting which comes the last day of the session, it simply means that no practical results can be reached until the next meeting of the association in 1912.

Doctor Heiser.—I would like to ask Doctor Atkinson to add the opium question to the list he has given. The most excellent paper of Sir Allan Perry again brings to our attention in a most forcible manner the value of the resolutions of the last International Conference on Leprosy at Bergen, because they aid us as health officers in our contention that in order successfully to combat this evil it is necessary to segregate lepers. The Legislature of the Philippine Islands, several years ago, did put into force the principles involved in the resolutions of the international conference, and as has been mentioned by Doctor Perry, the result thereof in the Philippine Islands has been most gratifying, the total number of lepers having been reduced from 4,000 to 2,300, which reduction is believed to be due to the fact that new infections are prevented.

In view of the great prevalence of the disease in oriental countries, and since the delegates to this association represent nearly all the governments concerned, it seems to be most appropriate and fitting that a set of similar resolutions should be favorably acted upon by this Association.

The following committees were appointed by the chair:

Plague.—Doctor Atkinson, chairman; Doctors Highet, Hooton, Castellani and Strong.

Leprosy.—Doctor de Haan, chairman; Doctors Staby, Neeb, Shibayama and Heiser.

Opium.—Doctor Fraser, chairman; Doctors Beebe, Staby, Neeb and Musgrave.

Quarantine.—Doctor Brooke, chairman; Doctors Highet, Atkinson, de Haan and Heiser.

Tuberculosis (local committee).—Doctor Musgrave, chairman; Doctors McLaughlin, Christensen, Andrews and Sison.

Beriberi.—Doctor Highet, chairman; Doctors Strong, de Haan, Fraser and Aron.

The following resolutions were finally adopted by the association:

TUBERCULOSIS.

Resolved, That the Far Eastern Association of Tropical Medicine should use its influence to cause the formation of a national antituberculosis society in each political entity represented in the Far Eastern Association of Tropical Medicine. These societies to be formed along the lines of existing antituberculosis societies in other parts of the world, yet revised to facilitate the work under local conditions.

LEPROSY.

Resolved, That—

1. Leprosy is to be regarded as a dangerous communicable disease.
2. Compulsory notification of all cases of leprosy to the authorities is essential.
3. Compulsory segregation of all cases of leprosy is necessary, and preferably in special colonies constructed for the purpose.
4. The entrance of aliens afflicted with leprosy into a country must be prohibited.

QUARANTINE.

Resolved, That the Far Eastern Association of Tropical Medicine, appreciating the benefit which would accrue from concerted sanitary action on the part of Eastern governments, be empowered officially to approach the following Governments, namely: Philippine Islands, Japan, Hongkong, French, Indo-China, Siam, Netherlands-India, Straits Settlements, and Ceylon, with the view, if possible, of obtaining their official support on the following lines:

1. To have a common standard for the term "epidemic," when making reports to, or imposing quarantine against, each other.

We suggest the following definition for consideration:

Plague, cholera, smallpox, or yellow fever shall be considered to be epidemic, when, after the first telegraphic report of its occurrence, any weekly report thereafter shall show the occurrence of an average daily number of three cases.

2. To agree to notify each other's territories as infected, only when the infectious disease shall have assumed epidemic proportions as defined above; and automatically to withdraw such notification when the average number of cases for three successive weeks has fallen below the status epidemicus as above defined.

3. To circulate weekly returns of plague, cholera, smallpox, or yellow fever amongst each other, and also a telegraphic report on the first occurrence of any of these diseases, in a clean port or territory.

4. To insist on a bill of health being carried by all ships, leaving a country declared to be infected, which intend to proceed to the port of another signatory; such bills of health to include a return of infectious disease for the previous forty-eight hours.

5. To report by telegram to the country concerned the departure of an infected or suspected ship (as defined by the Paris convention) which may intend to proceed to any port in the territories of another signatory; and to indorse the bill of health of the said infected or suspected ship with a full account of measures taken to disinfect or otherwise deal with the said vessel.

PLAGUE.

Report.—In our opinion the only practical measure concerning plague that we can recommend is the advisability of each country represented agreeing to notify other countries the occurrence of cases of plague within their borders, the first case by telegram and afterwards by weekly returns.

OPIUM.

Report.—Your committee, appointed to consider the opium question, regret that the time at their disposal precludes the possibility of giving the subject adequate consideration.

They have reviewed the work done and the resolutions agreed on by the International Opium Commission, Shanghai, 1909.

With these resolutions your committee are in agreement, but it is to be regretted that the paucity of medical commissioners prevented the question being dealt with fully in its medical aspects.

Any measures which are introduced for the control of opium must be adequate to guard against the danger of secret remedies containing opium and opium derivatives being substituted.

They would suggest that the delegates from the various countries represented at this conference should be asked to arrange that the regulations controlling the sale and use of opium in their respective countries, as well as any observations they may care to make on this subject, be submitted to the next meeting of this association in 1912.

BERIBERI.

Resolved, That in the opinion of this association sufficient evidence has now been produced in support of the view that beriberi is associated with the continuous consumption of white (polished) rice, as the staple article of diet, and the association accordingly desires to bring this matter to the notice of the various Governments concerned.

REVIEWS.

L'Insect et L'Infection, Histoire Naturelle et Médicale des Arthropodes Pathogènes. Par Raphaël Blanchard, Professeur à la Faculté de Médecine de Paris, membre de l'Académie de Médecine. 1er Fascicule: Acariens, 8°, 167 pages avec 197 figures dans le texte. Prix, broché 6 francs (= \$1.20) Paris, Librairie Scientifique et Littéraire, 4, rue Antoine-Dubois, Mai 1909.

The first fascicle of this very important work has recently come to our hand. As the distinguished author says: "The work is intended to set forth the important and very little known rôle played by the three groups of Arthropods in the propagation of infectious diseases: Arachnida, Myriapods and Insects, all classed under the general term Insect."

This portion of Doctor Blanchard's work deals solely with the *Acarina*, including the ticks and mites. The first chapter considers definitions of the *Acarina* in general and the family *Ixodidae* or ticks; the second deals with their morphology and anatomy; the third with their evolution and biology; the fourth with their systematic study and descriptions of genera and species. In these chapters nothing seems to have been omitted which will serve the average medical man in becoming acquainted with the group, both from the zoological and medical standpoints. The descriptions of organs and the account of the life history of ticks are treated in a manner at once clear and comprehensive, while the tables and descriptions of genera and species make the classification of the ticks which will usually be met by the physician and veterinarian comparatively easy.

The systematic works on this group by Nathan Banks, the American authority, have been freely requisitioned as have those of Dönitz, Pocock, and Salmon & Stiles. This, together with Doctor Blanchard's profound knowledge of the group has made his work the most up-to-date and complete of anything that has recently appeared.

The illustrations, of which there are some 197 in the text, are all carefully prepared and lucid. The bibliography is not what the word implies, as it simply indicates the authors who have worked on the groups and the date of their publications without the titles. However, it may be that Doctor Blanchard intends to append a bibliography to the last part. The work is to be completed in three or four parts and the remaining numbers are to deal with the *Diptera* (flies, including mosquitoes), the *Aphaniptera* (fleas) and the *Hemiptera* (bedbugs, lice, etc.).

A work of this character is certainly invaluable to the physician, especially in isolated tropical regions where access to libraries is not possible and where he needs to have a comprehensive digest of *all* that relates to insects and infection.

CHARLES S. BANKS.

Mammalian Anatomy With Special Reference to the Cat. By Alvin Davison. Second edition. Pp. 246. Price \$1.50 net. Philadelphia: P. Blakiston's Son & Co., 1900.

As the author states in the preface to the second edition, it is only a few years since medical schools have expected their students to enter with some knowledge of mammalian or comparative anatomy. It is now only a matter of time until all medical schools will require either a good course in comparative zoölogy, or in mammalian anatomy (perhaps both) as a prerequisite to entrance.

There is also a strong and growing feeling in the United States that college graduates in general should have an understanding of human anatomy and physiology. Davison's book is merely the last of several which have been prepared in response to these demands for the study of mammalian anatomy, using either the dog, cat, rat or rabbit as the type. For several practical reasons the choice is limited to the dog or the cat.

The anatomy of the cat is treated in a much better way by Reighard and Jennings, but there are many schools in which so extensive a course can not be given. It is to these that Davison's *Mammalian Anatomy* is directed. However, the book is too elementary. No student who is preparing for medicine, and probably no other college student, is ready to study mammalian anatomy until after completing a thorough course in zoölogy, which will give him a more or less philosophic conception of the animal kingdom. Without such a course the mammalian anatomy will fail in a large degree to accomplish its purpose. The reviewer believes it to be a mistake, if not an impossibility, to attempt to adapt a text to both elementary and advanced students, as the author has done.

The introductory chapter contains some very useful directions for teachers (certainly they can not be intended for students) regarding the preparation of the specimens for study. Those for the demonstration of the lymph vessels, for the preparation of the central nervous system, and for the cleaning of the bones, are especially good. However, in this day and age, it does seem as if even the most poorly prepared teacher must know what specimen jars and injecting syringes are like; therefore, figures of such objects (figs. 1 and 2) are decidedly out of place in any text-book.

The remainder of the book covers briefly the anatomy of the cat, taking up the parts in the following order: Skeleton, joints, muscles,

organs of digestion, vascular system, respiratory system, excretory and reproductive system, and nervous system. The descriptions are usually sufficient. A list of practical questions and suggestions is found at the end of each chapter. The latter are nearly all directions as to the drawings to be made, while the former are intended to direct the student's attention to important characters. It is a fair question if college students should not be expected to learn to see for themselves without such explicit hints. If they do not learn to use close observation, what becomes of the scientist's claim for the educational value of his subject?

The author makes a few observations in every chapter on the comparative anatomy of the Mammalia, but they are so feeble as to have no value, and are of a class generally which should be included in the lectures of the teacher giving the course. The same may be said of the remarks on microscopic anatomy and physiology, which also are found occasionally.

The list of definitions of terms used in osteology is good. The description of the skull is taken up in a new order, but accomplishes its purpose as well as any. The illustrations of the skeleton are the best in the book.

Some of the figures, as 12, 14, 35, 44, 52, and 64, are inexcusably poor. Fig. 88, which is a diagram of the structure of the kidney, is another illustration of the fact that an original drawing is not always an improvement on those already published and available. A figure of a generalized type of carpus (see fig. 36 B) is much better copied from an authority on the subject, and accredited to him, than offered as an original contribution by an author whose study of comparative anatomy has not been extensive.

For the study of the muscles the author gives first a well-drawn figure of each part, and then a table telling the name, origin, insertion, and function of each muscle. The combination is rather too much for the good of the student, and must tend to reduce this part of the course to pure memory work. The figures alone, with a few directions as to procedure, would be sufficient and would compel the student to do real dissection.

The consistent use of the terms *craniad*, *caudad*, etc., is not always pleasing. When two organs lie in the head, and one is described as "*craniad to*" the other, we know, of course, what is meant, but can not help feeling that the use is rather absurd, while the occasional employment of an Anglo-Saxon word would neither be absurd nor incorrect.

The chapter on the organs of digestion is decidedly unsatisfactory. This is the result very largely of the manner in which the author writes his description. As a matter of fact, the reader can not help feeling that every portion of the book proves that the author does not appreciate the power of the English language to express ideas, when properly used.

The discussion of the fiber tracts of the central nervous system belongs

to the provinces of special anatomy and physiology rather than to elementary mammalian anatomy. The table of cranial nerves on page 205 will prove convenient and helpful. It seems a mistake not to insist more strongly on a careful dissection of the cranial nerves, especially the vagus; there is nothing definite in the book concerning the course of this nerve and that of the phrenic. The figure of the sympathetic nervous system (p. 107) and the description in the text of the middle cervical ganglion do not agree. The remarks regarding the convolutions of the brain in mammals are misleading, as usual.

A complete glossary is a valuable feature of the book. The text will undoubtedly find a wide use in American colleges, in spite of its failings, for it fulfills the essential requirements of the teachers in those schools.

The work of the publishers has been performed excellently.

LAWRENCE E. GRIFFIN.

A Compend of Histology. By Henry Erdman Radasch. Pp. 350. Price \$1.00 net. Philadelphia: P. Blakiston's Son & Co., 1909.

Quiz-compend, which originally were prepared as a first aid to lazy or imbecile students of medicine, are developing for the better along with the improvement of medical education. This little book of Doctor Radasch, though published as one of Blakiston's series of quiz-compend, will scarcely be recognized as belonging to the group of educational pacifiers usually known by that name. It might better be called an outline of histology, since it differs from textbooks of the usual type mostly by the brevity of the descriptions.

In the first chapter (30 pages) the author describes the ordinary processes of preparation of histological material and gives the formulae of the reagents most used. A very limited amount of technique should be expected of students in the ordinary course in histology, while the more complicated processes should not be attempted by the student. Nevertheless, the description of these processes may be a considerable aid by enabling the student to understand the treatment of the sections he is required to study. If this chapter is intended to fulfill such a purpose, its presence may be justified.

This book includes chapters on the fetal membranes, the "nerve system," "the eyeball and lacrimal system," the ear, the senses of smell, taste, and touch, and on the development of the face and teeth. The illustrations are sufficient for a book of greater pretensions.

The author is fortunate in his ability to write short and unusually clear descriptions, which are complete but not tedious. A few of his definitions are open to criticism, for instance when he writes that "metabolism is the *change* that takes place in a cell during the performance of its functions." Possibly the critic is captious, but metabolism seems to be

better described as a process than change. Nor is the classification of secretion and excretion as simple as the author states.

It would be very much better if the writers of text-books on histology would not treat of amitosis as if it were an ordinary and common method of nuclear division. To be able to state that cell-division is of two varieties, direct and indirect, seems beautifully clear and simple and appeals to our love of antithesis. As a matter of fact, the probabilities are that the student of histology will never see an example of amitosis, and the chances are that the instructor himself has seen very few cells actually undergoing amitotic division. The student would get a very much more correct idea of its *unimportance*, if amitosis were only described in connection with the tissues where it occurs, and if he were told that amitosis is usually found in decadent or degenerating tissues, and that there exist grave doubts of its being in any sense a normal process in metazoan tissues.

The author should have made it clear that the process of segmentation described on page 42 is not the usual one observed in the animal kingdom, but a very peculiar process limited to some of the mammals.

The mechanical work of the book is done in a very satisfactory manner. Some of the figures and diagrams are original and a few are improvements on the ones usually published. On the other hand, some of the figures copied from other text-books have suffered in the process.

The principal criticism of the book is that it offers nothing which other texts do not give in a better way. It escapes being a real quiz-compend, but does not attain the dignity of a text-book, while it is certainly not a laboratory manual. For the teacher who wishes to give as extensive a course in histology as is outlined in this work, there exist several text-books which are so much superior to it in the treatment of the subject, that Doctor Radasch's book can not be compared with them.

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